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THE

VISITOR'S GUIDE

TO THE

PUBLIC ROOMS AND CABINETS

OF

AMHERST COLLEGE;

WITH

A Preliminary Report.

BY

CHARLES H. HITCHCOCK, A. M.,
CURATOR OF THE CABINETS AND LECTURER ON ZOOLOGY.

AMHERST:
FOR SALE BY THE JANITOR, NO. 10 NORTH COLLEGE,
AND BY THE BOOKSELLERS IN TOWN.
1862.

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Wm. J. Rhees.
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PRELIMINARY REPORT.

The Curator has several objects in view in preparing this brief outline of the Public Rooms and the most interesting objects in the Cabinets of Amherst College. The first is to furnish visitors with the means of profitably examining the collections, of which most persons, who pass through them without such a guide, obtain a very meagre knowledge. The second is to furnish visitors with a souvenir of the cabinets, which they can profitably examine on their return home. The third is a hope that visitors and others may be led to patronize the cabinets, either by pecuniary donations or by specimens; and especially when they learn that nearly all the collections have been placed here, not by money from the College treasury, but by individual effort and beneficence. The fourth is to make this pamphlet a sort of Curator's report of his labors and the present state of the cabinets, to the Trustees, Prudential Committee, the College officers, and friends in the community.

In reference to this last object the Curator ventures to remark, that he has reason to suppose that the nature and duties of his office are but imperfectly understood by many, and therefore he feels bound to state what in his view they embrace. It is probable that most persons consider that the chief and almost the only duty of the curator is to have an oversight and superintendence of the cabinets, taking care that they are kept secure from injury, and in a proper state for exhibition and use by the professors. These objects are indeed included in the office, though most of them belong rather to the janitor. But a curatorship, as it is understood in the large cabinets of Europe and

our own country, embraces many other objects; such as the following: —

1. One is to endeavor to supply deficiences in the collections, and to increase the number of specimens by correspondence with naturalists and others in various parts of the world, by exchanges and by expending any funds that may be obtained for that purpose. Any large cabinet will deteriorate rapidly where strenuous efforts of this kind are not made.

2. Another duty is to arrange the different collections according to the highest authorities, to fix a printed number and the name and locality upon each specimen, and make out a descriptive catalogue of the whole. Till this is done cabinets are of comparatively small value.

3. A third duty is to obtain by personal study, or the aid of distinguished naturalists, the true scientific names of all the specimens. No man living has a sufficiently thorough knowledge of all the branches of natural history to be able to give accurate specific names to large collections. Very few can do it in more than one science. Hence the curator must resort to gentlemen of distinguished ability, who have made a particular branch a speciality. This is a difficult, laborious, and somewhat expensive part of a curator's duty.

4. Fourthly, it is sometimes made a curator's duty to lecture upon one or more branches of natural history.

So extensive are these duties, that in many large cabinets it is customary to appoint several curators; one, for instance, in botany, another in zoölogy, and another in mineralogy and geology.

The Curator of the Amherst cabinets has considered all the above objects to belong to his office, and since his appointment, four years ago, he has done what he could to accomplish them. But he has labored under grave difficulties. The smallness of the compensation for the curatorship (one hundred dollars annually) has compelled him to be absent a considerable part of the year in other employments; though while absent he has been able to do not a little for the cabinets in collecting specimens,

carrying on correspondence, visiting distinguished naturalists and other cabinets, in order to get specimens named, etc. Indeed, he thinks that nearly half of his time has been given to his curatorship; and the following are among the objects accomplished: —

1. Opening a correspondence with naturalists, graduates of the college, and others, especially with missionaries in distant regions. This has been done to a considerable extent; but the curator has felt cramped in this matter by the fear that if too wide a correspondence was opened, and too many exchanges negotiated, the pecuniary means in his hands (the income of the Natural History Fund) would be insufficient even to pay the necessary expenses. Yet the great number of foreign missionaries that have gone out from Amherst College, and their generous readiness to obtain specimens without compensation, make this a most important branch of the curator's duty.

2. Obtaining new specimens such as the following: —

(*a.*) Fossil footmarks of the value of more than one thousand dollars. These were paid for chiefly from a fund in the hands of the Curator's father, obtained by him for this purpose from benevolent individuals.

(*b.*) *Zoölogical Specimens:* — Mammals, 150; Birds, 490; Fishes, 175; Invertebrates, 800.

(*c.*) *Geological Specimens:* — Rocks from Vermont and Rhode Island; Fossils from Africa, Asia Minor, England, Ireland, Virgina, Vermont, New York, Kansas, the Rocky Mountains, New Brunswick, Maine, Rhode Island, Pennsylvania, South Carolina, etc., amounting to upwards of 2000 specimens.

3. Obtaining the names of specimens. The Curator has not ventured to do this on his own authority to much extent, except in geology. But he has been fortunate enough to obtain assistance from eminent naturalists, so as to get names placed upon the following collections by those to whom they were sent at Washington, Ohio, Albany, Cambridge, and Montreal.

(*a.*) The Fishes sent to the Smithsonian Institution.

(*b.*) The Crustaceans sent to Prof. Spencer Baird, of Washington.

(*c.*) The Echinoderms sent to Prof. Agassiz.

(*d.*) The Carboniferous and Tertiary Fossil Plants sent to Leo. Lesquereux, Esq., in Columbus, Ohio, and Principal Dawson of the McGill College, Montreal.

(*e.*) The Fossils of Vermont to Prof. James Hall, of Albany, and E. Billings, Esq., Palæontologist of the Canada Survey, Montreal.

4. Considerable progress has been made in the great work of arranging, labelling, and cataloguing the collections; especially the following: —

(*a.*) Printed names have been attached to nearly all the specimens of fossil footmarks, prepared on a small hand-press owned by the department of Natural History, and according to the "Ichnology of New England," where they are described. A full descriptive catalogue is also well advanced.

(*b.*) The same has been done to the Massachusetts collection of rocks and minerals.

(*c.*) Also to the Vermont collection of rocks, minerals, and fossils.

The last two collections are fitted up according to the Curator's *beau ideal* of the manner in which a cabinet should be labelled, viz. with a printed number referring to a catalogue, and a printed name on each specimen, so that they can be studied without taking them from the cases. To carry this system through all the Amherst cabinets must require several years of labor; but it would exceedingly enhance their value.

(*d.*) In bringing Professor Adams's great collection of mollusca together from several rooms, it became necessary to rearrange the whole, in order to place the specimens in the order which he had indicated. This has been done, and it proved a work of no inconsiderable labor. A similar work has been performed among all the classes of animals, or all the specimens exhibited in the zoölogical cabinets.

The specimens of most of the reptiles have just (1862) been sent to Mr. Edward D. Cope, of Philadelphia, for names; and he is abundantly qualified to give them correctly.

(*e.*) A brief course of lectures on Zoölogy, amounting to ten or twelve, has been given to the Senior Class, by the Curator, each of the four last years; also, several on Geology, occasionally to aid his father when required, agreeably to an understanding with the Trustees.

This summary will show, it is hoped, that the Curatorship is no sinecure, and that something has been done to bring the cabinets into such a condition as will make them most valuable and useful. But they will also see that a great amount of work remains to be done.

The Curator wishes it to be understood that he has had nothing to do with the Cabinet of Professor Shepard, that gentleman having had the entire oversight and management of his own collections. So also, the committee, after the expenditure of the Natural History Fund, employed for one season Mr. George Goodale to arrange the herbaria. The Professor of Geology, likewise, has done what severe infirmities would allow him in his department. And it might be thought that each Professor ought to act as curator in his department. Were there Professors for all the great branches of Natural History, as in the European Universities, as there is for Mineralogy and Botany, it might be the best course. But as matters now stand, a large part of the collections would be left unprovided for. The Curator is, indeed, the assistant of the Professors, while he looks after all that is not embraced in their departments.

The following pages will show essentially the general state of the cabinets, but the following summary of their contents at present will give a better idea of their extent: —

MINERALS, ROCKS, AND FOSSILS.

Simple Minerals,		2,200
Rocks and Fossils of Continental Europe,		600
do.	from England,	600
do.	from Asia,	1,200
do.	from the West Indies,	225
do.	of the United States,	4,000

Rocks and Fossils of Massachusetts,	3,200
do. of Connecticut,	800
do. of Vermont,	2,300
Fossils — a general collection from Europe,	500
do. from the Permian Formation,	100
do. from the Paris Basin,	124
do. miscellaneous from Europe, Africa, Kansas, etc.,	500
Economic collection of Minerals and Rocks from Europe,	300
Polished Marbles, Alabasters, etc.,	162

PLANTS.

Dried Plants (species),	4,000
Smoothed Sections of Wood,	175
Seeds and Fruits,	400

ANIMALS.

Manikin and Casts of Human and other Crania.	63
Mammals (Quadrupeds), stuffed, and Skeletons,	130
Birds,	256
Nests of Birds,	70
Eggs of Birds,	175
Reptiles,	150
Amphibia,	85
Fishes,	250
Crustaceans and Worms,	200
Insects (species),	4,800
Mollusca,	8,000
Animals of Mollusca,	155
Radiated Animals (Corals, etc.),	250
Amorphozoa, Sponges, etc. (specimens),	127

FOOTMARKS.

Individual Tracks,	9,000

PROFESSOR SHEPARD'S CABINET.

Simple Minerals (specimens),	10,000
Technological Collection,	500

Meteorites (specimens),	162
Fossils and Rocks (specimens),	6,000
Mollusca (specimens),	5,000
Dried Plants (species),	6,000

ARCHÆOLOGICAL COLLECTIONS.

Nineveh Gallery. Sculptures, Bricks, Antique Gems, Pottery, etc., Modern Articles of Dress, Ornaments, etc., from Mesopotamia; Fresco, etc., Coins, chiefly ancient,	1,000
Virtu. Casts in Sulphur and Plaster, and Copper Medallions	317
Indian Relics,	1,100

The greatest deficiency in the collections is probably in the fossils. The Curator hopes that some benevolent gentleman who may notice this fact will be led to appropriate one or two thousand dollars to supply this most important desideratum, as might now be done to great advantage.

The Curator would say a word in regard to the true theory of a college cabinet; or, in other words, the objects to be aimed at in amassing these various specimens. The grand object is to afford to students an opportunity of seeing and examining systematic collections of all the animals and plants that now live, or ever have lived, upon our earth. The nearer the collections approach completion, the more perfect will be the knowledge acquired from them. It is not to be expected that every student whose attention is directed to the study of Zoölogy and Geology will make a proper use of his privileges. Indeed, so far as the majority of students are concerned, very meagre collections would suffice. But for the few who are determined to make the most of their advantages, comprehensive collections are necessary. The grand plan upon which all created objects are built, as it has been illustrated by the Creator, must be learned, and this cannot be appreciated until the whole series of animate beings has been arranged in systematic order, presenting all the links of the chain at once to view. No certain conclusions of practical or religious interest can be obtained from an incomplete series.

No preconceived notions of the order or completeness of creation are of any value until tested by the objects themselves.

A secondary object of a college cabinet, and one of no small importance, is to afford transient visitors much valuable knowledge. No college, it is true, would make this a primary motive for the establishment of a cabinet; still, the imparting of knowledge to a community is important. In the year 1859, by actual count, it was ascertained that the Appleton Cabinet was visited by fifteen thousand persons, and many of them spent hours in examining the collections, so that it may be taken for granted that they were interested, as well as profited, by what they saw. The cabinet can be seen, at all hours of the day, by visitors, without any charge.

C. H. H.

AMHERST, MAY 1, 1862.

VISITORS' GUIDE

TO THE PUBLIC ROOMS AND CABINETS.

There are ten large buildings on College Hill, owned and occupied by the authorities of Amherst College, viz. the Johnson Chapel, three dormitory buildings, Williston Hall, Barrett Gymnasium, Appleton Cabinet, Woods Cabinet and Lawrence Observatory, the President's house, and the Library building. The Johnson Chapel, two dormitories, Williston Hall, and the Appleton Cabinet are in the centre, upon the crest of the hill, and all face the west, being in a line with one another. The Barrett Gymnasium and one of the dormitories are upon an elevation east of the chapel row of buildings; the Woods Cabinet and Lawrence Observatory are situated upon the crest of a hill west of the Chapel; while the President's house and the Library building are situated upon the west side of the highway, directly south of the village church. This arrangement of the buildings is in one sense accidental, since, when the plans were laid for the construction of the first buildings, no one imagined that other buildings than a chapel and four dormitories in a row would ever be needed. Moreover, the new buildings have been added from time to time, each one without anticipation of the succeeding; so that there has been no general method in their arrangement. For certain reasons, however, this wide distribution of the buildings has been found very convenient.

The best view of the College buildings, as a whole, is from a small hill (the Dome) more than a quarter of a mile southwest from the Chapel. From this eminence every building except the Gymnasium can be seen. Another

good view of the buildings can be obtained from a point in the highway, a short distance west of the railway station-house. This brings the Gymnasium into full view, while the Appleton Cabinet is hidden, and many of the other buildings are seen only from their rear.

THE COLLEGE TOWER.

Those who love a fine view of natural scenery, should not fail to visit the Tower attached to the Johnson Chapel; or at least the smaller towers upon Williston Hall and the Library building. That from the chapel is the best, because the stand-point is the highest, being ninety-four feet above the top of the hill, and about three hundred feet above the ocean. The visitor will here learn how beautifully the College is situated,—upon a small eminence, in one of the loveliest valleys in New England, but environed by mountains. Upon the east are Mounts Lincoln, Hygeia, and Aquilo; upon the north, Mounts Pleasant, Taurus, Mettawampe, and Sugar Loaf, whose curious outline and bright red color render this aspect of the scenery exceedingly picturesque. To the northwest, in the distance, may be seen Bald Mountain, Mount Pocumtock, the Hoosac Mountains, and the far-off Green Mountains of Vermont. Upon the west appears Mount Warner; and beyond the Connecticut river, set off by the beautiful serpentine water-line of that noble stream, lie the high mountains of western Massachusetts. But the most noted mountains, and those which instantly arrest the attention, from their beautiful position and outlines, are the several peaks comprising the Holyoke range; being in order, from east to west, Mount Norwottuck, Holyoke, Nonotuck, and Tom. The undulating valley vies in interest with the mountains, thickly interspersed as it is with forest, cleared land and meadow, set off by occasional ponds of water, and several villages. Ordinarily, the villages of Amherst, Hadley, Northampton, Easthampton, Whately, and Sunderland are visible from this summit.

THE LIBRARY BUILDING.

As the visitor approaches the colleges from the village, he first passes the Library building. This is built of gneiss from Pelham, and was erected in 1853, through funds given by friends of the College. The library is mostly in the second story, and contains twenty thousand volumes. Upon the first floor are the reading-rooms. In the passage-way may be seen a cannon which was captured from the rebels in the battle near Newbern, on March 14, 1862. It was captured by the Twenty-first Massachusetts Regiment, Lieutenant-Colonel (Professor) Clark commanding. It was given to the regiment by General Burnside, and by the regiment presented to Amherst College. The names of the brave men killed upon that occasion are engraved upon the cannon. Among them was a member of college, Adjutant F. A. Stearns, son of the President.

Passing up stairs, the room containing the books may be seen, and it is the only room in the building above the first story. The room is crowded with books, insomuch that more space is needed in which to display the books. Several portraits adorn the library-room: among them are the three first Presidents of the College, — Dr. Moore, Dr. Humphrey, and Dr. Hitchcock, — Hon. David Sears, Prof. Fiske, Prof. Warner, Hon. Samuel Williston, and Galileo. From this room the passage to the tower is not difficult.

WILLISTON HALL.

Leaving the Library we will pass to Williston Hall, the brick building north of the Johnson Chapel. Its three stories are devoted to different objects, and each story has a separate entrance. The upper story is the Alumni Hall, devoted to the annual examinations of all the classes, and to the meetings of the Alumni at commencements. In the second story are the halls of the Athenian and Alexandrian Societies, which contain the libraries belonging to the two organizations, each numbering over five thousand volumes.

The whole of the lower story is devoted to a chemical laboratory, and has ample accommodations both for the academical course of general chemistry, and for private instruction in analytical chemistry. It is divided into six apartments: the lecture-room, working-room for analysts, furnace-room, balance-room, and the Professors' private laboratory. The College is indebted to the munificence of the Hon. Samuel Williston, of Easthampton, for this edifice, who so nobly came to the rescue of the College in its days of darkness and despondency.

THE GYMNASIUM.

Passing through the "Grove," the visitor will see an unpretending stone building with its name in front, "Barrett Gymnasium." Of late the interest of visitors has been largely absorbed by the novelty of the objects of this edifice and the department it typifies. The different kinds of apparatus, the bowling-alleys, dumbbells, swings, ladders, spirometors, etc., best explain themselves when used by some one of the classes in their regular exercise. At present visitors can be sure of witnessing an exercise upon four days of the week; viz. Monday, Tuesday, Thursday, and Friday, both in the morning and afternoon. Visitors may test the power of their own muscles upon any of the apparatus, at any hour when there is no regular exercise.

As this institution is a new one, and excites great interest among the friends of education, I will give here a notice of its operations, prepared from official documents in November, 1861.

VITAL STATISTICS OF THE STUDENTS AT AMHERST COLLEGE.

The Gymnasium at Amherst College has now been in full operation more than a year, and the results on the health, and the consequent intellectual vigor of the students, have more than realized the anticipations of the friends of the enterprise. A committee of the Trustees, consisting of Dr.

Allen of Lowell, Dr. Paine of Holden, and Dr. Alden of Randolph, recently visited Amherst to observe the practical working of the physical department, and they expressed themselves very highly pleased with the good effects produced in so short a time. During the past term, since Dr. Edward Hitchcock, Jr., has had the charge of this department, everything connected with the Gymnasium has been reduced to exact system, and a full and accurate record of the vital statistics of the students has been kept. The report for the term has just been made out, and it embraces many facts which will be of the highest interest to all who are concerned in the subject of physical culture in our institutions of learning.

A physical examination is made of every student on entering college, similar to the examination of volunteers for the army, only not so thorough, the main object being to ascertain whether he has any imperfections so great as to impede his usefulness as a professional man. This examination is repeated twice each year during the course, and the statistics are made out class by class and posted up in the gymnasium for constant reference, so that every student is at once able to compare himself with others, and ascertain whether or not he is keeping up to the average standard. Each student is required to spend half an hour in the gymnasium on four days of the week, and absence from this exercise, tardiness, and indecorum, are marked the same as at the intellectual exercises of the college. In addition to this half hour, about two thirds of the students spend as much more time in exercise every day in the week of their own accord. This compulsory exercise has been objected to by some, but experience shows that punctual attendance here is no more irksome than at any other of the college exercises. Moreover, it is the constant aim of the Professor in this department to have as great a variety in the exercises as possible, so that not only shall every muscle be called into play, but also that fun may be added for the students, which is considered almost as necessary as exercise itself. The bowling alleys are the most constantly used of any of the means of exercise, and with the exception of the hours for meals and recitations, the balls are

constantly on the move. No betting is allowed, nor has there ever been a disposition to indulge in it. A military drill with muskets has also been a regular weekly exercise for the past term. This, however, has not been entered into with the alacrity which these war times would seem to inspire, and the other exercises of the gymnasium are decidedly preferred, because they are less monotonous. The students all wear a suitable uniform, of a material and make which is much better adapted to a free motion of the body than ordinary clothing. The uniform of each class is different, and when the members of a class are all exercising together, the uniformity of dress is very pleasing.

The design of the physical department, is not to make accomplished gymnasts and acrobats, but simply to secure to scholars an amount of exercise that shall tend to develop the physical man, in order that the intellectual man may more perfectly accomplish his purpose. And it has been found that, as a general rule, the best students intellectually are the best in the gymnasium. Accidents in the gymnasium have thus far been few and far between. It appears by the health record kept by Dr. Hitchcock during the past term, in which are noted all absences for a longer period than two days on account of sickness, that the whole number on the sick and injured list for the term was only seven, and only two of these were injured in the gymnasium, while these two were absent only four days each. One case only of typhoid fever has occurred, and this appeared on the first day of the term. This exemption from sickness, in a community embracing two hundred and fifty persons, is of itself a strong argument in favor of the physical training which has been adopted in this institution. The following is a tabular view of the vital statistics of the students in college, as ascertained by the last examination, and recorded by the professor of the physical department:

	Age. Years.	Weight. Pounds.	Hight. Feet.	Girth chest. Inches.	Girth arm. Inches.	Girth forearm. Inches.	Average strength.
Seniors	22.816	133.359	5.570	34.559	11.050	10.593	9.440
Juniors	20.992	131.441	5.662	34.976	11.372	10.967	9.953
Soph's	21.186	138.627	5.751	35.325	11.500	10.767	8.300
Fresh.	20.022	126.946	5.563	33.946	10.860	10.666	6.760
Av. all coll'ge	21.261	132.643	5.636	34.701	11.147	10.750	8.613

The oldest man in college is thirty-one years and four months old; the youngest, fourteen years and ten months; the heaviest man in college weighs one hundred and eighty-one pounds; the lightest, eighty pounds; the tallest man in college is six feet three and one half inches high; the shortest, five feet high; the number of years lived by all college is four thousand six hundred and sixty-three, and the weight of all college is twenty-nine thousand and sixteen pounds, or fourteen and one half tons.

THE ASTRONOMICAL OBSERVATORY.

The Astronomical Observatory consists of two parts, the telescope tower and the transit-room. The transit-room is on the right, after entering the outer door. It contains the transit circle and sidereal clock. These instruments are for observing the exact moment when the sun, or any star or other heavenly body, crosses the meridian, and also the altitude at the same moment. The transit circle is mounted on two stone piers, which stand on solid masonry beneath, and do not touch the building. The telescope attached to this circle can be turned so as to point to every part of the meridian from north to south; and the walls and roof can be opened for this purpose. The clock is hung upon a separate stone pier, and keeps sidereal time. Two small telescopes, of portable size, are usually kept in the same room.

The large telescope is at the top of the tower, beneath the dome, and a spiral stair-case leads to it. The tube of this telescope is made of paper; the object-glass is seven and one fourth inches in diameter, and the focal length of the instrument about nine feet. By the use of several different eye-pieces, the magnifying power can be varied from fifty to five hundred in diameter. By opening the window, and revolving the dome on the iron balls, the telescope can be pointed to any part of the sky. A clock is let into the side of the stone pier, for the purpose of giving motion to the telescope, in order that it may keep up with the diurnal motion of the heavenly bodies.

THE CABINET OF NATURAL PHILOSOPHY.

The principal part of this collection is in No. 3, Chapel building; but as the articles have become too numerous to be accommodated conveniently in that room, a few additional cases are erected in No. 7.

If the visitor, on entering room No. 3, turns to the left, and goes to the east end of the room, he will find two cases filled with apparatus for illustrating the principles of *Mechanics.* Beginning near the recitation-room door, and moving to the left, he will observe in the first case Atwood's machine, occupying the whole height of the case, used for illustrating the laws of falling bodies. The same case contains several models of the simple machines, — as pulleys, levers, weighing instruments, gearing, etc. In the second case are articles for experimenting on the collision of balls, the centre of gravity, compound motion, and friction; also models of machines, such as the capstan, tread-wheel, crane, etc.

Still moving to the left, the two cases on the north side, between the corner and the door of entrance, contain most of the apparatus for *Pneumatics.* In the first is a large air-pump, and a variety of small articles in brass and glass for pneumatic experiments. The narrow case by the door contains the air-condenser, barometers, and articles for air-pump experiments.

Passing the door, the visitor finds two cases, a narrow and a wide one, in which the *Hydrostatic apparatus* is kept. In the narrow case he will observe models of water-pumps, syphons, and apparatus for making fountains, and for experimenting on hydrostatic pressure. In the second and wide case are the hydrostatic balance (Masson's) and other instruments to illustrate water pressure, a hydraulic press, and models of the water ram, Barker's mill, Archimedes' screw, a fire-engine, and other instruments.

On turning the corner, to the west end of the room, the two first cases are filled with apparatus for *Optics.* The first contains microscopes, perspective instruments, revolving apparatus for vision, a magic lantern, and a frame and

lenses for the extempore construction of telescopes. The second (or middle) case has numerous optical articles, as convex and concave mirrors, and lenses; also prisms, variously mounted, Biot's and Soleil's polariscope, instruments for experimenting on vision, the heliostat, etc. The third case is appropriated both to *Optics* and *Acoustics*. It contains a sonometer, bells, organ pipes, small organ bellows, and many other pieces for experimenting on sound. But the articles of chief interest in this case are the *wave* instruments, for illustrating water-waves, waves of sound, and waves of light, invented by Prof. Snell.

There is one other case, on the wall of the room, a wide one, situated between the windows. The articles in this are somewhat miscellaneous. There is a large sectional model of a steam-engine, a small working model in a glass case, and other articles for experiments on steam; also apparatus for showing the laws of the pendulum, of rotary motion, etc.

The double case in the centre of the room is occupied with the apparatus for *Electricity* and *Magnetism*. In the east end of it is the electrical machine, the plate of which is twenty-five inches in diameter. There is a battery of nine jars, another of three jars, and a great variety of single Leyden jars, for different experiments, beside a full assortment of other apparatus for illustrating the properties of electricity. The magnetical apparatus is at the west end of the case.

WOODS CABINET AND LAWRENCE OBSERVATORY.

Upon the hill west of the Chapel Row are the Woods Cabinet and Lawrence Observatory, in one general building. It is quite a relief to see on the hill one set of buildings different from the plain rectangular forms elsewhere on the grounds, some of which are erected in accordance with the *Yankee order* of architecture.

The first suggestion that led to the erection of this building, was the offer of Professor Charles U. Shepard to deposit his cabinet at Amherst College, provided a fire-proof

building could be built for its reception. This led to a vote of the Trustees, in August, 1846, for the erection of such a building, provided the sum of five thousand dollars should be secured by subscription; and the President, Hon. David Mack, Hon. Samuel Williston, Deacon Andrew W. Porter, and Hon. Josiah B. Woods were appointed a Building Committee: which gentlemen have had the oversight and direction of the work to its completion. The Trustees also appropriated to this object a fund left as a legacy to the College by Mr. Samuel Stone, of Townsend, which originally amounted to five hundred dollars, and which was specifically directed to be applied to the erection of new buildings.

In the winter of 1846–7, the architect (Mr. Henry A. Sykes, of Springfield) drew a plan of the building; but it was not till the next summer that any efficient movement was made to procure funds. Hon. Josiah B. Woods then undertook the work, and it was mainly by his judicious and persevering efforts that the requisite sum was procured.

The following list contains the names of all the subscribers to the building, with the amount contributed, save a few days' work, each by several of the citizens of Amherst, in preparing the ground. These names are engraved upon a marble slab in the vestibule:

Hon. Abbot Lawrence, Boston,	$1,000
Samuel Stone, Esq., Townsend,	920
Hon. Josiah B. Woods, Enfield,	400
John Tappan, Esq., Boston,	300
Andrew W. Porter, Esq., Monson,	300
R. P. Waters, Esq., Salem,	300
Hon. John Dickinson, Amherst,	250
James T. Ames, Esq., Cabotville,	250
Justin Ely, Esq., West Springfield,	200
Thomas Bond, Esq., Springfield,	200
Dea. Ichabod Washburn, Worcester,	200
Hon. Daniel Safford, Boston,	200
Samuel Lawrence, Esq., Lowell,	200
Wells Southworth, Esq., West Springfield,	200
O. M. Whipple, Esq., Lowell,	200
C. B. Bigelow, Esq., Lowell,	200
Hon. Samuel Williston, Easthampton,	200
Hon. Alexander De Witt, Oxford,	200
Samuel A. Hitchcock, Esq., Brimfield,	200
George H. Gilbert, Esq., Ware,	200
Enos Dickinson, Esq., Amherst,	200
Luke Sweetser, Esq., Amherst,	200

Phelps, Dodge & Co., New York City,	$200
Henry A. Sykes, Springfield,	150
George Gill, New Haven,	150
William W. Stone, Esq., Boston,	100
Hon. Joseph Avery, Conway,	100
Professor Charles U. Shepard, New Haven,	100
Joseph Walker, New York City,	100
Robert Cutler, Amherst,	100
William B. Godfrey, Amherst,	100
William C. Anderson, Esq., New York City,	100
Alfred Edwards, Esq., New York City,	50
Gerard Hallock, Esq., New York City,	50
Rev. Samuel Worcester, D.D., Salem,	50
Professor Aaron Warner, Amherst,	50
Hon. Edward Dickinson, Amherst,	50
William Dickinson, Esq., Worcester,	50
Hon. John Leland, Amherst,	50
J. S. & C. Adams, Amherst,	50
Thomas Jones, Esq., Amherst,	50
Leonard M. Hills, Esq., Amherst,	25
William Kellogg, Amherst,	25
Rev. John Sanford, Amherst,	17

The total cost of the Cabinet and Observatory was nine thousand dollars. The money was all subscribed before a finger was lifted towards the construction of the walls. The Geological Lecture-Room and the Nineveh Gallery were added subsequently, the first in 1855 and the last in 1857. The lower cabinet is called the Woods Cabinet, in honor of Hon. J. B. Woods, of Enfield, Mass., whose generous efforts in procuring funds for the erection of the building, entitle him to the gratitude of the public. The Shepard Cabinet derives its name from Professor C. U. Shepard, who owns everything exhibited in it. The Lawrence Observatory receives its name from the late lamented Abbot Lawrence, of Boston, whose name heads the subscription list. The Dickinson Nineveh Gallery receives its name from Enos Dickinson, Esq., of South Amherst, who liberally supplied the means for its erection.

Outside of the building are several large specimens illustrative of geological phenomena. The most striking is a large boulder, having inscribed upon it "Class of 1857." It is covered with scratches upon four of its six sides, and the striæ are nearly all parallel to each other. Two of its sides, the one upon which is the inscription, and its opposite, are not striated. The boulder must have been crowded

by an iceberg, and moved along some distance beneath it, in order to have produced these marks. It was dug up in the road near the residence of Hon. Edward Dickinson. The class of 1857 had it transported to its present position, and delivered an oration and poem over it when it reached its resting-place. Dr. Stearns made some remarks about this removal which we will present here, as characteristic of both the persons alluded to, the speaker, and the one spoken of. The remarks were made in the presence of the American Association for the Advancement of Science, at their visit to the Cabinet in 1859: —

"To the energy and perseverance of Dr. Hitchcock they were indebted for that boulder at the door. (Applause.) He (Dr. H.) had known of its existence time out of mind. He says it came down from Pelham, years ago, when time was young, (Renewed laughter,) before Pelham existed in the divine decrees. He got hold of it, and then the elements began to move. One rainy day, when the President was out of town, he and the boys took it into their heads to have a play-day; accordingly, thirty-two oxen yoked themselves up, the trees broke themselves down, the dogs barked, the students shouted, the little boys entailed themselves upon the crowd, sixty-four students became sons of Erin, the boulder turned itself over and came up the hill, turned itself over once more at the college door, and established itself as curator to the cabinets for all coming time. It had been a long time on its way from Pelham, and had had some hard rubs and many scratches, which had not healed to this day. Some of the students, forgetful of reverence, had therefore misnamed it the "old scratch." (Loud laughter.) But he could bear testimony, nevertheless, that it had done its duty as a valued teacher. He was amazed when he saw it upon its return, and he asked himself, What next will Dr. Hitchcock do? When he woke up in the morning, Mount Holyoke or Mount Tom might be standing at the college door!"

Near the Nineveh Gallery is a large block of stone, filled with several bodies made up of concentric rings, and are apparently remains of zoöphytes, of the genus Stromatopora, a variety of ancient corals. It is from the Lower

Silurian Limestone, near Saratoga, N. Y. Another boulder has a small trap-dike cutting through it, and looks upon the outside like a ribbon stretched around the stone, though interrupted. It is from Pelham. Near it are two large specimens of gray silicious limestone, from Colerain, Mass., in which are exceedingly beautiful tortuous veins of white granite. Other specimens about the door, are, two large columns of green stone from Mount Tom; two potholes; a large fucoid from Greenfield; trap-dikes from Pelham; boulders striated by a plough, and marked by worms, to show the difference between these markings and the striæ of drift, as may be seen upon the large boulder; and specimens of conglomerated syenite from Northampton. The latter specimens illustrate the theory of the metamorphism of rocks, showing that portions of a coarse conglomerate may be changed to syenite before the obliteration of the sedimentary character of the rock.

Within the vestibule of the building are several interesting specimens. Upon the left wall are polished specimens of the beautiful verde-antique serpentine from Roxbury, Vt., presented by the class of 1859, and of the "Winooski marble," or dolomitic marble of the Potsdam group, from Colchester, Vt. Other specimens of the Roxbury and Cavendish serpentine are upon the opposite side of the vestibule. The other specimens here are two large trunks of fossil trees from Portland, Ct., taken from the Connecticut river sandstone.

THE WOODS GEOLOGICAL CABINET.

A large part of the specimens in this Cabinet are arranged in cases standing against the walls. We will suppose the visitor, on entering the room, to turn to the left, when he will meet the following collections, as he passes around the Cabinet, arranged in the wall cases; and we advise him to examine these first, around the whole room, before he turns his attention to the collections in the central parts of it.

I. — THE ROCKS OF CONTINENTAL EUROPE.

The first collection on the left-hand side of the door, beneath the gallery, consists of six hundred specimens of rocks and petrifactions, exhibiting the entire series of rock formations on the Continent of Europe, particularly of Germany, and arranged according to the system of Professor Von Leonhard, a distinguished geologist. The specimens are usually three inches by four, and behind them are suspended printed labels in three languages, viz. the German, French, and English. The fossils amount to about one third of the whole, and are those most characteristic of the several formations. Several of the rocks, fully represented in this collection, do not occur in this country, at least not with the same characters, — for instance, the Chalk, Oolite, Lias, etc., — and hence they are studied in this collection to much advantage.

The visitor conversant with the rocks of the Connecticut valley, will be struck with the resemblance between them and many specimens of the Red Sandstone Group in this collection. The impression of fossil fishes (No. 319) can indeed scarcely be distinguished from those found at Sunderland, Cabotville, and South Hadley canal.

It would amuse the literary man to observe some of the translations from the German and French into English, which a part of the labels exhibit. For instance, No. 172, is sand; and No. 173 has this: "*Sand of the Brown Coal Formation.* It appears likewise-how that of the preceding nummer."

Beneath the windows in the Cabinet, are placed such large specimens as could not be got into the glazed cases. In the first window may be seen a curious specimen from the river Nazareth, in Western Africa, sent by Rev. William Walker, of the Gaboon Mission. It is mounted upon pivots, so that by rotation all sides of the specimen may be readily seen. It probably has a concretionary or geodic structure, to discover which would require the destruction of the specimen. This, with a few other smaller specimens, were the only stones seen over the whole of a plain three hundred miles in diameter.

II. — THE MISSIONARY COLLECTION, CHIEFLY FROM ASIA.

Beyond the first window the rocks of Continental Europe occupy most of the first tier of cases. They are followed by a few tertiary fossil from the Paris Basin. They were presented by Mons. E. Desor. Two hundred and twenty-four species of molluscs are represented from this basin, which is classic ground for the geologist.

Immediately following them, the visitor will find a collection of more than twelve hundred specimens, sent mostly by American missionaries. The following are the names of the missionaries who have gratuitously furnished these specimens: —

Rev. Justin Perkins, D.D., at Oroomiah, Persia.
Story Hebard, at Beiroot, Syria.
Benjamin Schneider, at Broosa, Asia Minor.
Pliny Fisk, Palestine.
Oliver P. Powers, at Broosa, Asia Minor.
O. P. Allen, at Broosa, Asia Minor.
Henry Holmes, at Constantinople.
Cyrus Hamlin, at Constantinople.
Henry J. Van Lennep, at Constantinople and Tocat.
J. J. Robertson, D.D., at Constantinople and Athens.
James L. Merrick, at Tabreez, Persia.
George E. Whiting, at Abeih, Mount Lebanon.
Daniel Bliss, at Mount Lebanon.
Joel S. Everett, at Smyrna, Asia Minor.
Daniel Poor, at Ceylon.
Nathan Ward, M.D., at Ceylon.
Rev. Elijah C. Bridgman, D.D., at Canton, China.
Henry Lyman, at Sumatra.
Ebenezer Burgess, at Ahmednuggar, India.
Joseph Goodrich, at Sandwich Islands.
Ephraim Spaulding, at Sandwich Islands.
Alonzo Chapin, M.D., at Sandwich Islands.
Mr. Alexander G. Paspati, at Constantinople.
Mr. Homan Hallock, at Malta and Smyrna.
Mrs. Susan Champion, at Cape of Good Hope.
Rev. H. P. Herrick, at Western Africa.

The following gentlemen, having obtained specimens from

the same region as the missionaries, have presented them to the College, and they are included in this collection: —

Professor Edward Robinson, D.D., in Palestine.

Professor Sylvester Hovey, in Italy.

Professor Nathan W. Fiske, in Greece, Syria, and Palestine.

Professor J. A. Richards, in Egypt.

When we consider the feeble health of Professor Fiske, and how entirely his previous habits seemed to unfit him for the work, it is surprising what large and valuable additions he has made to the cabinet: not less than two hundred specimens.

It increases the interest in this collection to know that two thirds of the above-named gentlemen were graduates of Amherst College. And the value of the collection is enhanced, when we consider the difficulty and danger often, of procuring specimens in barbarous and unfrequented regions, where travelling must be performed on horseback, and where every movement of a stranger is watched with great jealousy. The picking up and carrying away specimens of the ore of arsenic, exhibited by No. 985, from the mountains of Kurdistan, is said to have been a principal cause of the assissination of the traveller Schulz. In one instance, Dr. Perkins brought on a fever by his efforts to obtain specimens from the top of one of the peaks of the Ararat range; and when other means of packing specimens failed, on a journey upon horseback of seven hundred miles, he used one or two pairs of pantaloons and other parts of his wardrobe for the purpose; and they came hither thus freighted. What a pity that they were not preserved unemptied, and hung up as a trophy and a memento!

The collection under consideration is arranged geographically; that is, by countries. The following countries are represented by the number of specimens attached to each: —

	Specimens.
Italy,	88
Malta,	19
Greece,	11
Grecian Archipelago,	125
Northern Asia Minor and Turkey in Europe,	250

Syria and Palestine,	400
Egypt,	50
Armenia,	136
Persia,	58
India,	70
Ceylon,	27
Cape of Good Hope,	10
Western Africa,	60
China,	7
Sandwich Islands,	26
Java,	9

In the Missionary Collection, probably a large part of the specimens will interest most from the sacred or classical localities where they were obtained; yet, as a whole, they do give important knowledge of the rocks. In the countries around the Mediterranean, for instance, we find abundant evidence that the prevailing rock is limestone, either soft or chalky, or hard and compact. A great number of specimens might be referred to, to illustrate this statement.

Nos. 87, 88, 92, and 520, are chalky limestone, the common rock of Malta.

Nos. 152, 153, 154, Mars Hill, Athens, Greece.

No. 89, Malta: the specimen having an acute point. On the label Mr. Hallock has written, in sportive allusion to the rage among Papists for relics: "The *very point* against which St. Paul was wrecked!"

The following are from Syria and Palestine:—

No. 552, west side of Anti-Lebanon; No. 454, Beyroot; No. 588, Damascus; No. 592, from the Inn of the Good Samaritan; No. 595, Mount of Olives; No. 760, from the Pyramid of Cheops in Egypt. All these are made up mainly of microscopic shells, called Polythalamia. No. 1213, Gibeon.

Nos. 557 and 571, from one of the stones in the foundation of Solomon's Temple, known from the peculiar style in which it is wrought; No. 1200, Gethsemane; No. 1214, Mount Carmel; No. 1226, from the Tomb of Zachariah; No. 1241, Gibeon; No. 763, from the Protestant Burying-Ground on Mount Zion; No. 767, from the spot where Siloa's font first gushes up, and flows away in a subterra-

nean channel; No. 768, probably the rock on which the Palace of David was built, on Mount Zion; No. 770, Mount Zion, over against Hinnom; No. 774, from a rock in the Mosque of Omar, which stands upon the site of the Jewish Temple.

Sometimes this compact limestone is red, or striped, as in the following examples: No. 556, Anti-Lebanon; No. 559, Abraham's Tomb, Hebron; Nos. 572 and 764, Jerusalem; Nos. 772 and 773 (striped, red), Jerusalem; No. 775, Mt. of Olives.

The preceding numbers exhibit the predominant rocks of Syria and Palestine, extending also into Egypt. Other interesting rocks, however, occur in connection with the chalky and compact limestones. Nos. 638 to 647, show various ferruginous sandstones from Mount Lebanon; No. 623 is a limestone pebble from the Jordan where Christ was baptized; No. 584 is granular limestone, from Aceldama; Nos. 566, 569, 570, show a very peculiar black bituminous limestone, containing twenty-five per cent. of bitumen, from the west shore of the Dead Sea, and the Sea of Galilee: it is wrought into various useful and ornamental articles.

No. 616 is a coarse, porous limestone, with petrified shells from Beyroot, obtained by Professor Fiske from the yard of a Moslem, where it was brought for building. The label accompanying it is too curious to be withheld:—

"The noise of breaking this specimen," says he, "as I was but a few feet from the door of the house, brought out an old woman, in a filthy Arab dress. She drew her *mandil* (mantle) down over her forehead, holding it with her left hand under her chin, leaving her right hand free for gestures, and her lips at liberty for speech, and with a little fierce-looking black eye, and sallow, shriveled face, she came at me with a tremendous volley of Arabic, in a shrill screech, frightful enough to make one's hair stand on end. Not a single word could I understand; only I used my Yankee faculty of guessing that she was scolding the impudent and thieving Frank, and that if I did not somehow silence her noise the whole neighborhood would be roused, and what woes might then betide me not even a Yankee could guess. I had no Arabic to explain, or apologize, or

entreat; but for my good luck, I had that very morning learned Arabic enough to say, *Shoo-hi-dah*, what is that? and this was the whole length and breadth of my vocabulary. So I put my right hand, first on my breast, then to my forehead (the Arabic mode of salutation), and with a smile and tone as gracious as I could make, held out my specimen, and pointing to one of the little shells in it, said, 'Shoo-hi-dah? Shoo-hi-dah?' She raised her eyebrows, relaxed a little her grasp of the mandil, and looked at the shell, and cried, *Allah*, *Allah*, *hi-dah bwak*. O God, God, that is *bwak!* then resumed her furious scolding and yelling. I carefully laid down the stone on a block, and picking up a little pebble, held it out and said, *Shoo-hi-dah*, etc., etc., and thus finally calmed her down, and made my escape. Had I known *Katyr*, *Khyr ak*, I certainly should have closed with it.

"A day or two after, I walked through the same yard, and found my specimen lying where I laid it down, and I then quietly put it in my pocket." *Feb.* 1, 1847.

Most of the limestones of Syria and Palestine have been referred by geologists to the chalk formation; and as we should expect, we find flint in it, as No. 654, from Anti-Lebanon; No. 656, Mount of Olives; No. 657, Mount Carmel; No. 1231, Mount Scopos (Mount of Olives continued); Nos. 1228, 1229, 1230, Beyroot. This flint and hornstone often form fine agates, as Nos. 1323, 1324, from Lebanon; No. 661, near Tyre; No. 655, from Gethsemane. No. 662 is a large geode of chalcedony from Safed; and Nos. 663, 664, are beautiful geodes of crystalized quartz, which are very abundant at Babda on Mount Lebanon, from the size of a hen's egg to that of a man's head.

Mount Lebanon abounds with petrifactions; and by the efforts of Mr. Hebard and Professor Fiske, who have sent most of the specimens from Syria and Palestine, our collection is rich in these relics of ancient animals. All the specimens from No. 665 to 719, and from No. 1265 to 1322, amounting to 109, are of this description; embracing fish, echinoderms, molluscs (shells), encrinites, corals, and a few plants. Nos. 1278 and 1279, are aggregated remains of

the Hippurite, a very peculiar shell, no longer existing alive, yet abundant in the waters that deposited Mount Lebanon. No. 1279 is nearly a foot in diameter, made up of these same shells, converted into quartz. Among other sorts of shells, we find the Ostrea (Nos. 686, 657, and 1269 to 1271, from Aleck, 4000 feet above the sea), Isocardia, Venus, Arca, Ammonites, Strombus, etc. No. 1310, Pycnodus, a genus of fishes.

In a letter from Professor Fiske, after putting up a box of these fossils, we find the following amusing remarks: —

"In this trip (from Beyroot to Abeih and Bhamdŭn) I have gathered oysters and clams, and I cannot tell what other fish, cooked (you perhaps know when) in old Pluto's or Vulcan's kitchen, pickled down (or rather *up*, for I found some of them on summits thousands of feet high) and preserved by the help of Neptune, and for aught I know the mermaids too; for all which, the geologists will thank them; more grateful, I imagine, than the poor donkeys, whose burdens are often increased by not a few pounds, weight of these ante-mundane delicacies. At Abeih, I boxed for you what a Carolinian would call a '*mighty big*' lump, weighing less than a ton. It will doubtless prove a *Jactalite* (a rock to be thrown away) should it ever reach you. All I shall ask of you, provided it thus terminate, is, that you will bestow on the innocent fishes a decent burial beneath the turf."

Although all marble is limestone, and the compact limestone above referred to seems to have been employed for common buildings in Jerusalem, and other parts of Syria and Palestine, yet the marbles employed for public structures are of a different character, and were brought from abroad. A large number of these, from interesting localities, are in this collection. They are mostly granular, white, or gray; resembling, in fact, very closely, the marbles found in the western part of Vermont, Massachusetts, Connecticut, and from the same range extending southwesterly through New York, New Jersey, Pennsylvania, and Virginia. The following specimens will afford the visitor good samples.

Nos. 14, 15, 16, Antiques, Italy; No. 107, from the Colosseum, Rome; No. 155, Temple of Victory, Athens; No.

156, Acropolis, Athens; No. 164, Minerva Polias Caryatides, Athens; Nos. 151, 160, 161, from the Propylea, Athens; No. 159, Parthenon, Athens; No. 281, Temple of Juno, Samos; Nos. 284, 350, and 351, Temple of Apollo, Cnidus; No. 357, Colossæ; No. 359, Theatre of Ephesus; No. 364, Thyatira; No. 451, Jewish Cemetery, Smyrna; No. 452, Amphitheatre at Smyrna, where Polycarp suffered martyrdom; No. 455, Temple of Esculapius, Smyrna; No. 463, Gate of ancient Nice; No. 498, Pavement of ancient Carthage; Nos. 604 and 605, Temple of the Sun, Baalbec; No. 603, Tombs of the Kings, Jerusalem; No. 606, Church of St. Johns, Samaria; No. 609, red, Baalbec; No. 742, Mount Moriah, Jerusalem; Nos. 743, 744, 745, Mount Zion; Nos. 746, 747, Mount Zion, near the tomb of David; Nos. 748 to 756, Jerusalem; No. 757, Mount Ophel, the highest part of Mount Zion; No. 759, Valley of Jehosaphat; No. 760, a triangular piece, — worked out probably by some one waiting for the moving of the waters, — fished up from the Pool of Siloam; No. 761, Tower of Ramleh, Jerusalem; Nos. 998, 989, argillaceous, from the ruins of Persepolis, Persia, wrought so as to look like petrified shells.

One notices with melancholy interest the numerous specimens in this collection from Mount Zion, when it is known that they were collected by Professor Fiske, only three or four weeks before he was himself laid there, in the Protestant burying-ground, near the Tomb of David.

The ancients were in the habit of breaking up the compact limestones above described, into little square pieces of different colors, and arranging them, and bedding them in mortar, so as to form pavements or floors. Several examples of this kind occur in this collection, along with examples of their stucco and plaster, which have resisted decomposing agencies for thousands of years, and which, therefore, are interesting to the geologist, as well as the builder.

No. 65, stucco from a column of a temple in Pompeii; No. 65, plaster from the interior of a house in Pompeii; Nos. 67 and 502, mosaic, Baiæ, Italy; Nos. 368, 369, mosaic, Island of Delos; No. 496, mosaic, near Smyrna; Nos. 501 and 637, mosaic, Beyroot; No. 503, mosaic, pavement

of ancient Carthage; No. 630, Roman cement, from a cistern, Beyroot; No. 632, Roman cement, ruins of Citium; No. 867, mosaic, from a church in Trebizond; No. 990, mortar glazed, ruins of a Mosque, Tabreeẓ; No. 1117, plaster, from the summit of the Tower of the great heathen temple in Madura, India; "struck by lightning," says the missionary, at the time the missionaries arrived, — an expression, it is said, of the displeasure of the goddess; No. 1118, mortar from an old fort in the district of Jaffna, Ceylon; No. 1166, cement from the top of the pyramid of Gizeh in Egypt.

From No. 162 to 247, are numerous fossil shells of the Tertiary strata, sent by Mr. Van Lennep, from the Island of Rhodes. The seventy-eight specimens, from No. 372 to 450, are from Mount Olympus, near Broosa, sent by Mr. Schneider, and they are almost the only ones in the collection that correspond at all to the rocks of New England, containing granular limestone, calcite, tufa, gneiss, hornblende slate, mica slate, granite, epidote, garnet, etc. Nos. 801 to 936, sent by Dr. Perkins, exhibit a full suite of the rocks of ancient Armenia, from Trebizond to Ooroomiah in Persia. A large proportion are limestones, like those in Syria and Palestine, of a dirty yellow color. No. 857, from the western branch of the Euphrates, is beautiful white alabaster, used in Armenia for mortar, but might be wrought into ornaments, as it is in Italy. No. 939 is an equally fine example from the plain of Ooroomiah, mountain of Bizov, where it is abundant. No. 785 is a similar alabaster, used for building the Pasha's palace in Egypt. Nos. 944 to 954 show the rocks at Mount Seir, the health retreat of the missionaries, near Ooroomiah. No. 955, marble from the monument on the grave of Mrs. Dr. Grant, Ooroomiah. Nos. 978 and 979 show the famous Tabreez marble, or alabaster, deposited by hot springs, and semi-transparent; very few examples of such deposits occur.

The vast regions from which the specimens above referred to have been derived, exhibit, in some parts, evidence of volcanic agency, so that lava is not unfrequently met with. Unstratified rocks, indeed, of every age, — that is, such as have been some time or other melted, — occur. The following are examples: —

Nos. 19 to 64 exhibit a full collection of lavas from Italy, especially Vesuvius; Nos. 370, 507, and 484, from the famous Katakekaumena, or Burnt District of Asia Minor, not far from Philadelphia; Nos. 477, 478, 479, 487, 488, 489, trachyte, Smyrna; Nos. 726, 729, lava, west shore of the Dead Sea; No. 725, lava, ruins of Jericho; No. 738, lava, from an ancient crater near Safed; Nos. 734, 740, lava, west side of the Sea of Tiberias; Nos. 731, 739, trap, Anti-Lebanon; No. 788, famous red granite, or syenite, from Syene in Upper Egypt; No. 1173, syenite, taken from Cleopatra's Needle, Egypt; Nos. 786, 787, antique red porphyry, ruins of Alexandria, Egypt; Nos. 1262, 1263, lava, Mount Ophel (Mount Zion), not native there; Nos. 868, 869, 874, lava, from Mount Ararat; No. 875, obsidian, Armenia.

Nos. 1016 to 1082 show a fine collection of trap rocks (similar to those of Mount Holyoke), with several rich minerals, such as chalcedony, amethyst, thompsonite, apophyllite, etc., from near Ahmednugger in India, sent by Rev. E. Burgess.

Nos. 1141 to 1165 show a good collection of lavas from the Sandwich Islands, mainly from the great volcano of Kilauea. No. 1155 is volcanic glass, called by the natives Pele's Hair; Pele being the goddess of the volcano.

No. 970 is beautiful rock salt, dug from Red Mountain, near Tabreez; Nos. 847 and 863, the same, from Armenia; No. 794, the same, from Mount Sinai, where the Israelites turned to encamp by the Red Sea; No. 548 is rock salt, from a hill several miles long, of the same substance, on the southwest shore of the Dead Sea, near the site of ancient Sodom.

No. 795 is pure yellow sand, from the deserts of Arabia, collected by a Mohammedan pilgrim, on his way from Persia to Mecca, from the moving sand hills of that country.

No. 722, water of the river Jordan; No. 723, water of the Pool of Siloam; No. 724, water of the Dead Sea; Nos. 859, 860, water from mineral springs near Trebizond; No. 992, water from Lake Ooroomiah; Nos. 993, 994, water from the Caspian Sea.

UNITED STATES COLLECTION.

To the right of the entrance to the Nineveh Gallery commences a collection of the rocks and fossils of the United States, excepting those States represented largely in separate collections. At the time of the preparation of this "Guide Book," the specimens belonging here have not been arranged fully, or even catalogued. About two thousand have been catalogued, and a few particulars can be given of them, while the rest must be noticed in very general terms. This collection is not owned by the College, but is deposited by Professor E. Hitchcock, Sen., and the Curator.

It is prefaced by twenty-seven specimens of the simple minerals constituting rocks, forming the alphabet of Geology. From twenty-seven to ninety-nine, represent Alluvium; among which is a tooth, found in Amherst (No. 42), of the fossil horse, much larger than the present species, that once lived in this country, a contemporary of the Mastodon. No. 60 is a tooth of the mastodon from Ohio. No. 59 is a part of the contents of the stomach of the great mastodon found in Newburg, in 1845; and No. 58, a portion of one of his tusks. On the table in front of the case, is the remnant of one of these tusks several feet long; in a glazed case, and standing upright, are wooden models of both the tusks of the largest mastodon ever found. No. 63 is a cast of a fossil elephant's tooth (the mammoth) found in Homer, New York.

Nos. 100 to 173 are Drift. Among them are very fine specimens of grooves and striæ, produced by the drift agency. Some of these, lying upon one of the tables in the room, are two or three feet across; from the shores of Lake Champlain, from South Hadley, Greenfield, Rochester, N. Y., and Fall River, Mass. In the case are specimens from Christiana in Norway (Nos. 163 to 165), from Copenhagen (No. 156), and from the Alps (Nos. 167 to 173); some of them were produced by glaciers, and the whole collection is unusually instructive; nor do I know of a similar one.

From No. 201 to 381 we have rocks and fossils of the Tertiary strata. Nos. 225 to 360 are fossil shells, etc., mostly from the Southern States. Among these specimens,

may be seen (No. 329) the vertebra of a small whale; the cast of the head of a fossil porpoise (No. 359); do. of the humerus, or arm-bone of the huge *Oryctotherium* from Oregon (No. 360); No. 326 is an enormous shark's tooth, five inches long and four inches broad, which must have belonged to an animal not improbably from fifty to one hundred feet long! Such were the sharks that lived in the Tertiary period.

The Cretaceous formation is represented by only a few specimens. But the *Oolitic Coal Formation* of eastern Virginia exhibits eighty specimens (Nos. 440 to 521), from a shaft seven hundred and seventy-five feet deep, at the Mid Lothian pit, near Richmond, presented by Major A. S. Woldridge. From No. 562 to 565 is exhibited the Red Indian pipestone, from the Coteaux des Prairies, in the Sioux country, which rock is regarded with superstitious reverence by the natives.

The Carboniferous system, or true coal formation of the United States, covering in all over two hundred thousand square miles, or nearly thirty times the size of Massachusetts, is represented by Nos. 655 to 806. A large part are the vegetable impressions peculiar to this formation. The Bristol county coal-field, of Massachusetts, is represented here; and specimens of the coal, of a superior quality, may be seen in Nos. 801 and 802, also the Worcester anthracite, Nos. 804, 805.

The Silurian system of the U. S. is exhibited by nearly five hundred specimens, most of which are petrifactions.

It is not necessary to spend time to describe, in this brief account, the non-fossiliferous rocks of this collection, which must be studied in detail in order to profit by them. The clay slate is represented by Nos. 1417 to 1463. A full suite of the gold formation in North Carolina, is shown from Nos. 1497 to 1526. No. 1519 is a fine example of the Itacolumite, or flexible sandstone, which contains the diamond in South America, as well as in North Carolina.

The specimens in the gallery over these cases belong to the United States Collection, except a few claystone concretions which are connected with the Vermont Collection. They are mostly lithological specimens. To this collec-

tion belong also the specimens upon the north and south sides of the upright cases in the middle of the room. Upon the north side they consist of a large number of fossil fishes from the Connecticut river sandstone, and a series of fossils from New York. Upon the south side of the south case are specimens from all parts of the country, largely from Virginia and the Territories.

To this collection properly belong two horizontal cases of coal plants near the entrance, both upon the left and right hand side. Those upon the right are mostly from Pennsylvania, while those upon the left are mostly from the New England coal basin. Other large specimens of fossils (coal plants chiefly) are attached to the ends of the central upright cases. A large horizontal case at the west side of the room, contains fossil plants from the Connecticut river sandstone. Conspicuous among them is the Clathropteris rectiusculus from Mount Tom. The finest specimen of this fern, however, lies on the table adjoining the horizontal case. It is large, and shows distinctly the radiation of the fronds, so characteristic of tropical ferns. In the case may also be seen two species of remarkable undescribed Aroid plants, the larger from Portland, Ct., and the smaller from Turner's Falls.

MASSACHUSETTS COLLECTION OF ROCKS AND MINERALS.

This collection was made by President Hitchcock, during the Geological survey of the State, between the years 1830 and 1840. Quite a number of additions have been made to it since, more particularly of the footmarks on stone, fossil plants and fishes of the Connecticut river sandstone; insomuch that a whole room has been devoted to the former, and a horizontal and vertical case to the latter. The collection is intended fully to illustrate all the rock formations in the State, as well as their fossils.

A collection similar to this, and the only other one in existence that will compare with this, is exhibited in the Agricultural Rooms at the State House in Boston. The original arrangement of both these collections may be found in the final report upon the Geology of Massachusetts. But

partly owing to the progress of science, and partly to a defective arrangement of the numbers, the whole collection was classified anew and reärranged in 1859; and the new catalogue was published in 1859, in the annual volume upon agriculture issued by the Government for 1858. For the minute details, the visitor will find this published catalogue convenient for reference.

The collection is located in the cases occupying the whole space between the two windows upon the north side of the room. In the gallery, in the first apartment on the left-hand side, are placed the specimens illustrating Alluvium. There are two sets of numbers; the first consists of 152 specimens of soils, the greater part of which have been analyzed. (See Geological Report). The second set embraces the clays, sands, marls, peat, ochres, and drift, in all nearly 300 specimens. Near by the last specimens under alluvium, are some lightning tubes, or *Fulgurites*, from Montague. They are short, irregular tubes of sand, glazed on the inside. They appear to have been formed by the melting of sand as the electric currents left the ground to unite with the current meeting them from the clouds. They were discovered and presented to the Cabinet by Dr. A. Cobb, of Montague.

Directly under these shelves, and beneath the gallery, may be seen specimens illustrating the Miocene Tertiary. These embrace the hematites, or iron ores and clays of Berkshire county, from which a great amount of pig-iron is constantly manufactured. No fossils occur in this deposit in Massachusetts; but its geological age was determined from the beautiful fruits found in connection with these ores in Brandon, Vt., which are noticed in the Vermont collection. This formation is illustrated by 30 specimens. The next 101 specimens illustrate the Eocene Tertiary (or possibly cretaceous) strata of Martha's Vineyard, consisting of greensands, Kaolin clays, lignites, clay, iron ores, and various marine fossils.

The Connecticut River Sandstone formation is represented by over 300 specimens in the cases. The various conglomerates, sandstones, shales, limestones, and minerals of the group do not need special notice, nor the plants and fossil

fishes in detail. Part of them are in the same case with the Tertiary rocks, and the rest follow on in the top of the next case to the right, beneath the gallery. Among these specimens we would call attention to the *Clathropteris rectiusculus*, E. H., Jr., (Nos. 294, 295, etc.) a characteristic of the Connecticut River Sandstone in this country, and of the upper Trias and Lias of Europe. Another specimen worthy of notice, is a mass of native copper, weighing two and a half pounds. It was discovered in Whately, near the church, and presented to the Cabinet by Rufus and Dennis Dickinson. It would seem to be indicative of a larger mass of the same mineral in the vicinity. Another specimen, weighing a pound, may be seen in the collection of simple minerals from the same locality.

The next formation represented, following the sandstones, is the Carboniferous, or Coal formation. The collection includes a large number of specimens of coal plants, etc., from Rhode Island as well as Massachusetts. These fossils have been named for us by L. Lesquereux, of Columbus, Ohio, and Dr. J. W. Dason, Principal of McGill College, Montreal. The former gentleman has described several new species of ferns from these specimens, drawings and descriptions of which will appear in a great work upon the Carboniferous Flora of North America which he is preparing. Many of the specimens illustrating the coal formation of Massachusetts, are Azoic rocks, and the strata contain no beds of coal. This is the case with a belt of schists and slates extending from Worcester county down the Merrimac river to its mouth. The metamorphic agencies in the earth, long before man lived, seem to have greatly changed these stores of fuel. This process seems to have commenced in the beds of anthracite coal in the southeastern part of the State, and in Rhode Island, and the coal has been made hard and stony and of course not so easily burnt.

Next succeed some 30 specimens illustrating the Devonian, or Old Red Sandstone rocks of the State; and then 170 specimens of the Silurian and Cambrian rocks, which include most of the clay slates. To this group is assigned the slates in Braintree, containing the *Paradoxides Harlani*, green, and the taconic roofing slates of Berkshire county.

The next formations are the Azoic Limestones, mostly the Eolian limestone of Berkshire, and the quartz rock, which occurs mostly in the same county. A few dendrites in this collection are worthy of notice. There are 200 specimens of the limestones, and 118 of the quartz rock.

The Mica Schists embrace 231 specimens, the Talcose Schists, 150. Near the end of the latter, are specimens illustrating a section of the rocks from Greenfield to Berlin, N. Y., passing along the route of the Troy and Boston Railroad. Quite a number of specimens show the nature of the rocks through which the famous Hoosac Tunnel has been, and is to be, excavated. 60 specimens of serpentine show the characters of that rock, particularly a set of elegant polished specimens of precious serpentine from Newbury. 100 specimens illustrate the Hornblende Schist, and last of the stratified rocks are 250 specimens illustrating the Gneiss formation with its minerals. These two will be found in the gallery, in the cases to the right of the one containing the soils, etc.

The Unstratified Rocks occupy the rest of the shelves. These are: Greenstone, 150 specimens; Porphyry, 150 specimens; Syenite, 175 specimens; and Granite, 240 specimens. Among the porphyries are a large number of beautifully smoothed pebbles of different colors, from North Scituate. Among the granites will be noticed with interest two specimens (Nos. 62, 63) from the Pilgrim Rock in Plymouth, the rock upon which the first settlers of the State landed in 1620. These relics are the more valuable, since it is impossible to obtain more specimens from the original locality, in consequence of legal enactments. The visitor will also find several fine beryls from South Royalton (Nos. 214 to 221).

The total number of specimens in the Massachusetts Collection is 3200. They are owned by Prof. Hitchcock, Sen.

Beneath the window, north of the iron door, are several large specimens illustrating stratification; but particularly a small pot-hole, worn by water. It was taken from Connecticut river at Holyoke, by Consul B. Cutter, when the water was shut off for a time by the accumulation of the water above to the summit of the dam.

Between this window and the door are two collections beneath the gallery, of which we would say a word.

COLLECTION OF THE ROCKS OF ENGLAND.

In the next case beyond the window, near the bottom, commences a series of the rocks of England, amounting to nearly six hundred specimens. The specimens are much smaller than in the German collection, and some of the formations are scarcely represented. Yet they give an instructive view of some formations, entirely unlike anything in this country; e. g. the Chalk Formation, and the Wealden Group, which is fully represented. This is a fresh water formation, occupying a wide space in the southeast part of England, which appears once to have been the estuary of a large river, that has disappeared beneath the ocean.

On the banks of this river once lived enormous reptiles, such as the iguanodon; a few of whose bones may be seen in the collection (Nos. 816 to 828). This collection is owned by Professor E. Hitchcock, Sen.

COLLECTION FROM THE WEST INDIES.

This was obtained by Professor Hovey, mainly in the islands of St. Croix and Antigua. The first thing in the collection of special interest, is the large number of fossil shells and corals (Nos. 1 to 136) belonging to the most recent of the formations. They seem, in fact, to correspond very nearly to the molluscs now occupying the West Indian seas.

The fine and numerous specimens of wood converted into silex, is another point of interest in this collection (Nos. 137 to 156). The change is most complete, and yet the most delicate vessels of the wood are preserved; and even the mosses that once covered the decaying trunks present a natural appearance, even as to color. Several of the specimens are finely polished, and they form the most beautiful agates which nature furnishes.

No. 165 is a piece of the recent limestone rock from Guadeloupe, in which at least two human skeletons have

been found; and are now deposited, one in the British Museum in London, and the other in the Royal Cabinet in Paris. This rock is very hard; yet it is constantly forming by the action of the sea, and the skeletons are supposed to be those of Caribs.

COLLECTIONS IN THE CENTRE.

As the visitor enters the room he is at once struck by the beautiful example of plicated strata, or folia, opposite the door. It was taken from the bed of Deerfield river, at Shelburne Falls, Mass., and is one of the most attractive, as well as instructive, specimens in the room. Beyond it is a cast of the head of the Megatherium, a gigantic sloth of the later geological periods. In the centre of the room, in a square case, is a collection of five hundred specimens of fossils from Europe, which is an interesting one for study. Above them is a glazed box, containing specimens of calcite from Weyer's Cave in Virginia; also gypseus alabaster from the Mammoth Cave in Kentucky. Between this case and the door is a horizontal case filled with claystones, largely from Massachusetts.

Upon the other side, no one can pass by the immense cast of the head of the Deinotherium, the largest quadruped that ever lived. It was like an elephant in general structure, but had two tusks below, which may have served as an anchor, to prevent the animal from floating away when asleep; for he is supposed to have been aquatic in his habits, like the hippopotamus. Its size may be conjectured by comparing this head with that of the Mastodon gigantius, suspended from the ceiling, almost over the Deinotherium. The mastodon was larger than the elephant. The two models of large tusks of the mastodon came from the great Newburg mastodon, now exhibited at Dr. Warren's Museum in Boston. All that remains of the original tusk is in a glazed box at the foot of one of the models, as already noticed.

The specimens in the upright cases, facing the Deinotherium head, are European and Asiatic. Those upon the north side are, an economic collection from Europe, num-

bering three hundred specimens: fossils of the Permian group, specimens from Bordeaux, France, and fossils of the carboniferous limestone of Ireland. Upon the south side is a fine collection of fossil plants and fishes of Europe. The Asiatic specimens are to the left of the fossils, and are chiefly from Asia Minor and Syria. On top of these upright cases are models of large European specimens of Saurians, etc. They are the Plesiosaurus, Mystriosaurus, Ichthyosaurus, Pentremites, or Lily Enerinite, the Labyrinthodon, Zeuglodon, jaw of a mastodon, from Missouri, etc.

SPECIMENS UPON THE TABLES.

Four tables are filled with large specimens. Upon the one facing the Missionary Collection, are columns of trap from the Giant's Causeway in Ireland, and Mount Tom in Massachusetts; also septaria, or turtle stones. Upon the next table is a very fine specimen of the clathropteris, showing the radiating top of the tree; specimens illustrating veins in rocks and fossils, from the Black river, and chazy limestones of Vermont. The table north of this is filled with specimens illustrating drift striæ, mostly from Vermont. Upon the table facing the Massachusetts Collection are many United States fossils, waterworn masses of rocks, and interesting hippurites from Mount Lebanon in Syria.

COLLECTION OF POLISHED MARBLES, ALABASTERS, PORPHYRIES, ETC.

These amount to one hundred and sixty-two specimens, three inches square, sunk into a slab of white marble, and separated by narrow slips of black marble. They were put up at Rome, and exhibit many of the most beautiful rocks used in Europe for ornamental work, as well as many that are antiques; that is, found only in the old ruins. The slab is suspended at the farther end of the upright case, south of the Deinotherium's head. The specimens are arranged in nine perpendicular rows, or columns; or, if we reckon crosswise, in fifteen rows. The first vertical row consists almost entirely of alabasters. The next four columns ex-

hibit a great variety of the most esteemed marbles, among which the Breccia marbles predominate. Others are the famous Cipolin, Brocatellas, Parian, Pentelic, Carrara, Egyptian, and other antiques. In column sixth, we have Jasper and numerous Diaspores. In column seventh, are various Granites and Porphyries. In number eight, are Serpentines, Petrified Wood, Basalts, Verd-Antique, Malachite, Lapis Lazuli, etc. This slab was obtained in Rome by Professor Hovey, at an expense to the College of about sixty dollars.

DICKINSON NINEVEH GALLERY.

Attached to the Woods Cabinet is a small room containing ancient sculptures from Nineveh. The specimens were procured by Rev. Henry Lobdel, M. D., late missionary of the A. B. C. F. M. to Mosul. The room was built by the liberality of Enos Dickinson, Esq., of South Amherst. Besides the sculptures are several fresco paintings, nearly of natural size, of the most interesting objects from Nineveh, described by Layard.

Most persons know that Mr. Layard, an English gentleman, now a member of Parliament, at two several times, a few years since, spent many months in exploring the numerous ruins on the banks of the Tigris and Euphrates, in Mesopotamia, especially at Kouyunjik opposite Mosul, and at Nimroud, nearly twenty miles further south, both of which places Mr. Layard regards as probably within the limits of ancient Nineveh. The sculptures are from these two localities. Mr. Layard disinterred a great number of the rooms of the old palaces in these ruins, and sent such as he pleased to the British Museum in London, where is an immense collection. But he did not need them all; and being a personal friend of the American missionaries at Mosul and Ooroomiah, allowed them to select and send away to this country a large number. These specimens were forwarded to Amherst at two different times.

The sculptures are upon slabs of gypseous alabaster. They had to be sawed into slabs about two inches thick and

several feet square, so that they might be conveyed over 500 miles across Asia Minor, on the backs of camels, to Scanderoon. The boxes weighed about 280 pounds each. It is no wonder that they were somewhat broken when they arrived; but fortunately none of the cracks passed through the most delicate parts of the figures. The slabs are set in the walls of the gallery, and are situated nearly as they were in their original walls. We are fortunate to be able to present a notice of these sculptures from the pen of Mr. John Avery, Mathematical Tutor in the College, who has spent a great deal of time in studying the sculptures and the cuneiform characters engraven upon them.

Description of the Figures.

The ancient sculptures presented to Amherst College by Dr. Lobdel, of Mosul, and deposited in the Nineveh Gallery, are six in number. They are in the best and earliest styles of Assyrian art, which was marked by variety and elegance of form; and belong to a period as early as 930 B. C. As indicated by the inscriptions and the bas-reliefs, they were all taken from the northwest palace, Nimroud. This palace, built by Sardanapalus, was one of the most magnificent yet discovered in Assyria. It was 360 feet in length, and 300 in breadth, standing on a raised platform overlooking the Tigris. It consisted of a long central hall, surrounded by numerous ceiled chambers, whose sides and floors were covered with alabaster slabs, upon which were depicted scenes of every variety. The present position of the slabs conforms as much as possible to their original situation.

No. 1 represents an eagle-headed divinity, probably a type of the Supreme Deity; and he may be identified with Nisroch of Scripture, in whose temple Sennacherib was slain by his sons. He wears the flowing robe of the Assyrians, secured at the waist by a girdle terminating in cords and tassels reaching to the feet. The border of the robe is fringed and elaborately embroidered. Upon the neck is a necklace, and upon the arms and wrists are armlets and bracelets. The right hand is plucking a cone from the

sacred tree, while the left carries a square metallic vessel. In the girdle are two daggers.

No. 2 is a winged figure, probably a demi-god, and in dress and posture does not differ essentially from No. 1. The head is covered with a circular helmet. The beard and hair are very long, and, as in all of the figures, elaborately platted. There are sandals of wood or leather on the feet, ear-rings in the ears, and three daggers in the girdle.

No. 3 differs from No. 2 only in the ornament of the helmet, and the varied and beautiful embroidery of the robe. Some of the patterns are the mystic honey-suckle, alternating with the lotus or pine-cone, and winged figures.

No. 4 is Sardanapalus, who built the palace, and whose deeds are recorded in the inscriptions. He has returned from war victorious, and is offering thanks to his gods. His left hand grasps a bow, and his right holds a censer or basin of holy water. His head is covered with a helmet, peculiar to a king, surrounded by a band from which cords and tassels extend down the back. This king was a great conqueror, and styles himself the "one who has reduced under his authorities all countries, from the rising of the sun to the going down thereof."

No. 5 is another winged priest or divinity. The right hand is uplifted in the act of devotion, and the left holds a sacred flower. The head has no helmet, but is encircled by a garland.

No. 6 is an eagle-headed divinity, differing from No. 1 only in a few points of dress.

All the slabs bear inscriptions, reading from left to right, which are precisely identical, and refer to the king who built the palace. They are written in the cuneiform character, which was the monumental writing of the Assyrians, while an entirely distinct form was used for private documents. In the first line is found a genealogical list of three kings, which may be read thus: Sardanapalus . . . son of Tiglathi-Nin . . . son of Iva-lush II. [built this palace.] Between each proper name are numerous titles. The remainder of the inscription is probably taken up with an account of the building of the palace and the exploits of the king. Nos. 2 and 3 only contain the entire inscription.

There are also in the gallery five bricks bearing inscriptions, three from the centre palace, Nimroud, one from the N. W. palace, and one from Babylon. The bricks from the centre palaces bear the same inscription, in which we find the names and titles of three kings in genealogical order, which read: Shalmaneser . . . son of Sardanapalus . . . son of Tiglathi-Nin [built this palace]. The characters were generally formed by a sharp instrument before the bricks were baked. The inscription on the Babylonian brick is interesting as exhibiting an approach to modern printing, for the characters were impressed with a stamp. They are so minute and indistinct as to be hardly legible.

FRESCO PAINTINGS.

The fresco paintings on the walls are taken from sculptures abounding in the ruins of Assyria.

No. 7 is a winged human-headed lion. Pairs of these mythic forms are often found guarding the portals of Assyrian temples. The body of a lion and the head of a man denote a union of physical with intellectual power.

No. 8 represents Sennacherib at the seige of Lachish. Beneath is an inscription which reads as follows: "Sennacherib, the mighty king, king of the country of Assyria, sitting on the throne of judgment before the city of Lachish. I give permission for its slaughter."

No. 9 is a fish-god. The head of the fish forms a mitre above that of the man, while the scaly back and tail fall like a cloak behind. This figure may be identified with the sacred "man-fish," who, according to tradition, issued from the Persian sea, and taught the Chaldæans the arts and sciences. Dagon of the Philistines was worshipped under this form.

No. 10 is a Sphynx. The body is that of a lion; the head is beardless, the cap is square and highly ornamented at the top; a pair of wings supported a platform which may have been used as an altar, or place to receive tribute.

Nos. 11, 12, and 13 represent an Assyrian spearman, archer, and slinger. Their different styles of dress show them to be mercenaries from various nations in the Assyrian army.

No. 14 is a eunuch. This class seems to have been invested with somewhat of a sacred character, and are conspicuous in religious ceremonies.

No. 15 is a winged figure in a circle, a symbol of deity. In the early sculptures it is the only emblem of divinity which the king worships. It is usually represented as watching over the monarch, shooting arrows at his enemies in battle, and when triumphant, as here, uplifting the right hand, and holding in the left an unbent bow. This figure may have suggested to Ezekiel "a wheel in the middle of a wheel."

No. 16 is a fish-god, similar to No. 9.

No. 17 is a winged horse, from which the Greeks may have derived their idea of Pegasus.

No. 18 is a gryphon. It has the body of a lion with the wings and head of an eagle.

No. 19 is an Indian monkey, which an attendant secures by a heavy chain.

No. 20 is a wild bull from India. The Assyrians often brought home foreign animals from their distant campaigns.

OTHER COLLECTIONS IN THE NINEVEH GALLERY.

For want of room elsewhere, a large collection of Vermont claystones are placed in this room. They illustrate beautifully many phases of these very curious bodies. Another case contains lignites from Brandon, Vt., and Mount Lebanon in Syria. The latter is traversed by a vein of quartz. It was presented by Rev. Daniel Bliss, American missionary on Mount Lebanon, who sportively remarked in sending it: "This is one of the trees that Hiram did not send to Solomon."

The other two cases contain several articles, mostly in fragments, from Nineveh and Babylon; also, modern articles of dress and ornament from the same region, such as shoes, bracelets, lamps, pipes, spoons, caps, etc.

A fine collection of coins, mostly ancient, and other objects of virtu have been on exhibition in the Nineveh Gallery. But they present so strong attractions to the unprincipled purloiner as to need some special means of

security, an therefore the Curator has withdrawn them from exhibition until the Trustees shall order otherwise, or fit up an Archæological room, to be accessible only in special cases. Such a room is greatly needed, and it would contain the following collections: —

1. One of polished and engraved gems, seals, and cylinders from Nineveh and Babylon.

2. Coins of gold, silver, and copper, mostly ancient, Greek, Roman, Cufic, Persian, Russian, Hindoo, etc., in number 1000, commencing with those of Alexander the Great; found chiefly in Mesopotamia.

3. Sulphur casts of the medals struck by Napoleon Bonaparte during his reign, 185 specimens.

4. Plaster casts of the heads of illustrious men mostly ancient, 48 specimens.

5. Copper Medals struck by the government of the United States, 84 specimens.

6. The Indian relics consist of arrow-heads, spear-heads, bowls, pipes, pottery work, etc., of the North American Indians, mostly of those who lived formerly in the Connecticut river valley. More than 1100 specimens are embraced in it, which were collected and presented by Professor Edw. Hitchcock, Jr., and by him presented to the College. These are now on exhibition, temporarily, in horizontal cases in the Zoölogical room.

THE GALLERY.

Many of the specimens in the gallery have already been noticed, as they are the continuation of collections below, as the United States and Massachusetts collections. Two others remain to be noticed: the Simple Minerals, and the Connecticut Collection; the former presented by Prof. Edward Hitchcock, and the latter by Prof. C. A. Shepard.

The simple minerals are arranged according to the chemical classification, as drawn out in Dana's Mineralogy. There are 1900 specimens in all. An appendix to this collection, in the first case to the right of the window, consists of specimens illustrating the scale of hardness, the luster, refraction, and the crystalline form of minerals.

The Connecticut Collection, of 800 specimens, was collected by Prof. Shepard, when exploring the geology of the State under legislative authority. It consists of two parts: the geological part, showing the different rocks developed in the State; and the mineralogical part, displaying in scientific order the different minerals occurring in Connecticut.

GEOLOGICAL LECTURE-ROOM.

Attached to the Woods Cabinet is an octagonal Lecture-Room, whose entrance is through the Nineveh Gallery, as well as from abroad. Besides the ordinary paraphernalia of a lecture-room, there are several objects here of interest. First, are three embossed maps, or maps showing the configuration of the surface by actual elevations and depressions. They are of Europe, North America, and the Alpine region of Europe. The white parts represent the region covered with perpetual snow and glaciers. They are excellent aids to the study of physical geography.

Upon the walls are rough sketches of three extinct animals, intended to be of the natural size. The one upon the left, however, is too small, as may be seen readily by comparing its head with the model of the skull of the Deinotherium giganteum in the Woods Cabinet. The middle one is intended to represent the Megatherium. It was an immense sloth, one of the Edentate mammals, preserving the characteristics of our modern sloths. The third is a sketch of the largest species of Pterodactyle, or flying reptile, that has ever been brought to light. The length, from tip to tip of its expanded wings, must have been twenty feet. This animal had the head and neck of a bird, the mouth of a reptile, the wings of a bat, and the body and tail of a mammal. It could fly, creep, walk, and swim; thus, like Milton's fiend, qualified for all services and all elements.

VERMONT COLLECTION.

A large upright case on one side holds the Vermont Collection of rocks, minerals, and fossils, which was obtained

by Professor C. B. Adams, President Hitchcock, and the Curator, when engaged in the official survey of the State. Only those specimens procured by Professor Adams belong to the College; the others are deposited.

The following are the groups of rocks represented in this collection; also the order in which they are placed, commencing at the top and proceeding downwards: —

I. *Unstratified Rocks.* — Granite, Syenite, Protogine, Trap, Porphyry.

II. *Azoic Stratified Rocks.*— Gneiss, Mica Schist, Calciferous Mica Schist, Talcose Schist, Serpentine, Quartz Rock, Clay Slate.

III. *Fossiliferous Stratified Rocks.* — Potsdam Group, embracing the Quartz Rock mostly, Georgia Slate, and the Red Sandstone series; Calciferous Sandrock, Talcose Conglomerate, Talcoid Schists, Eolian Limestone, Chazy Limestone, Bird's-eye Limestone, Black river Limestone, Trenton Limestone, Utica Slate, Hudson river group, Upper Helderberg Limestone, Miocene Tertiary, and Alluvium. A large number of claystones really belong to this collection, but they are exhibited elsewhere.

We would call attention only to a few of these specimens, viz. to the concretionary granites, or "petrified butternuts;" the specimens illustrating the change from sedimentary conglomerate to granite; the series of traps from Shelburne; the numerous specimens illustrating the calciferous mica schist; the fossils of the Lower Silurian series, particularly of the Potsdam and Trenton groups, and the typical series of Miocene Tertiary fruits from Brandon, which were named by Leo Lesquereux, of Columbus, Ohio. The latter are the most valuable portion of the whole collection. The character of the trees of that period is indicated by the fruits better to the botanist, than by the large fragment of a trunk in the adjacent room. This specimen, when sent to Amherst, was labelled, "A piece of flood-wood, from Noah's Ark."

LARGE SPECIMENS.

Quite a number of large specimens are exhibited in the lower part of the case. Among them are a number of

elongated and distorted pebbles, from Rhode Island and Vermont, which are a unique collection, and of very great value in learning the true mode of the singular metamorphic process through which the stratified rocks are all passing. Other specimens are, the Stromatopora from near Saratoga, N. Y., an extinct coral. A large number of models of extinct animals are also placed here, particularly of the Iguanodon, Ichthyosaurus, Labyrinthodon, Plesiosaurus, Pterodactyle, Labyrinthodon, and foot of the Palapteryx. They are mostly constructed upon the scale of an inch to the foot.

THE SHEPARD CABINET.

DESCRIBED BY PROFESSOR C. U. SHEPARD.

This cabinet occupies the second floor of Wood's edifice, a fire-proof, octagonal structure that forms the central portion of several connected buildings, crowning the most beautiful eminence on the college grounds. The apartment, which is lighted from the roof and has a gallery, is forty feet in diameter. The entrance is from a small anteroom on the east, pierced on its south side with a circular window, from whence is obtained a view of South Amherst, Hadley, and the Holyoke range, that has been pronounced equal in picturesque beauty to any landscape in New England. This room contains along one of its walls the larger specimens of a collection of shells, the smaller being arranged in drawers. It represents more than 5000 species. On entering the cabinet, the visitor perceives that the arrangement of the mineralogical collection commences on his left with the front side of the top shelf, the specimens proceeding in rows to the rear, and again from front to back, and so on, in the same order, to the end of the case (behind each glazed door or pair of doors, secured by a single lock); it then returns to the shelf below. The spectator is thus conducted nearly round the room, before reaching the completion of the system. The collection is systematically disposed upon the two upper shelves only; those below are reserved for the reception of larger-sized specimens, and for the thinning out of the collection where

the samples above become so numerous as to interfere with the convenient inspection of the species.[1] The principle of classification is the Natural History method adopted in the proprietor's Treatise on Mineralogy, 3d edition, New Haven, 1856. The last three glazed doors, however, are devoted to a chemical classification, a single specimen being placed to represent each species. Here each specimen bears a printed label, giving its name and the chemical formula for its composition. Below the chemically arranged collection, is one consisting of imperfectly determined species. A third collection, arranged in three horizontal cases, placed upon cabinets in the room, illustrates the natural properties of minerals, each specimen having a printed label affixed, pointing out the particular property intended for illustration. A fourth collection, in a vertical case on the western side of the room, contains polished and artificially wrought minerals. A fifth vertical case (glazed on both sides), placed directly in front of the entrance, contains on the side next to the door, books, catalogues, etc., mostly relating to the collections; while its opposite is devoted (with the exception of a few large specimens of crystalized minerals lying together) to the meteoric cabinet. A portion of this much prized collection, however, is usually kept in an iron safe, placed contiguous to the upright cabinet. The two great blocks of African meteoric iron, and a third from Mexico, occupy glazed cases on the right and left of the lecture-table. A narrow horizontal case, filled with models of crystals, is placed upon the lecture-table, while the remainder of the models, together with goniometers, balances, and other instruments of mineralogical research, are now removed to Professor Shepard's lecture-room under the Johnson Chapel.

The meteoric case is surmounted with a cabinet, containing an herbarium of above 6000 species, the majority of which were collected in the United States.

The gallery is appropriated to the geological collection. Commencing on the left (as with the mineral cabinet below), the first case is partly devoted to the British provinces in

[1] The sashes in front of the two upper shelves are glazed with plate-glass.

North America. After this, the Northern and Eastern States of the Union follow in geographical order to Florida, the States of Connecticut, New York, the Carolinas, and Georgia being the most fully illustrated. Next follow the West Indies, England, France, and Continental Europe, concluding with partial series of rocks from more distant regions. It is intended to arrange the specimens systematically under each of these geographical regions; but thus far, time only has been at command to commence the work. For the same reason, the ticketing has not been more fully carried out. The collection contains about 6000 specimens.

The visitor who views these collections may desire to have his attention called to a few points, believed to be worthy of his particular notice. Of these the completeness of the mineralogical series is one. Few collections surpass it in this respect. Much attention has also been given to a representation of many of the species in all their varieties, especially those of crystalline form. The specimens being scrupulously protected against handling, dust, and excess of light, they exhibit their colors and lustre to unusual advantage. The visitor will remark that no specimen is admitted into the systematic series that has been artificially modified in any of its properties. The main collection is intended to show the contents of the entire mineral kingdom in their most important relationships, and in their unmodified condition. All minerals that have suffered artificial alterations will be found in the technological collection. The greatest number of specimens are ticketed with printed labels, attached directly to their upper surfaces. The general catalogue, however, with full notices of the localities is not yet made out. The number of specimens in the various mineralogical collections is over 10,000. The visitor will find the following species worthy of especial notice, viz., Calcite, Fluor, Barytes, Witherite, Apatite, Troostite, Triplite, Liroconite, Atacamite, Dioptase, Mendipite, Matlockite, Pyromorphite, Anglesite, Mica, Apophyllite, Harmotome, Scolezite, Lazulite, Feldspar, Spodumene, Pyroxene, Opal, Garnet, Quartz, Boracite, Axinite, Tourmaline, Zircon, Beryl, Chrysoberyl, Topaz, Spinel, Corundum, Brookite, Rutile, Columbite, Cassiterite,

Ilmenite, Manganite, Tetradymite, Chalcopyrite, Pyrites, Galena, Redruthite, Harrisite, Bournonite, Tetrahedrite, and Blende.

The meteoric collection has been in the process of formation since 1828, and now contains examples from 170 authentic localities, with a total weight of about 1000 lbs.[1] The oldest stone present whose fall is exactly known, is that of Ensisheim, France, November 7, 1492, and was purchased from the celebrated collection of the late Sir Francis Chantrey. The newest stone, of 53 pounds weight, is from Ohio, May, 1860. The large blocks of meteoric iron from Africa, from Mexico, from Ruff's Mountain, South Carolina, and Putnam county, Georgia, together with large stones from Bishopsville, South Carolina, from Linn county, Iowa, and from Cabarras county, North Carolina, may be considered worthy of especial notice.

Among the geological series, the most interesting groups are the Tertiary fossils of the Southern States, the auriferous rocks of the same section, the impressions of fishes, and the foot-prints of the Connecticut valley, the coal fossils of Ohio and Pennsylvania, the Silurian fossils of England, those from the chalk, oölite, lias, and coal of the same country, together with the reptilian fishes of Birdie-house near Edinburgh, the mountain limestone of Ireland, and the Triassic and Jura series of Germany. It will be borne in mind, however, that the entire geological cabinet has but very recently been distributed to the cases in the gallery. Much time will be required to perfect the arrangement, and to render the collection fully intelligible by labels.

CHARLES UPHAM SHEPARD.

AMHERST, Feb., 1862.

ICHNOLOGICAL CABINET,

OR THE CABINET OF FOSSIL FOOTMARKS.

This occupies the most of the lower story of the Appleton Cabinet. The principal room is one hundred feet long and thirty feet wide, and one of the side rooms, twenty-two

[1] The most valuable collection of meteorites is that in the Imperial

by eleven feet, is also filled with specimens; the three other side rooms being used, one of them as a duplicate room for ichnology, another for zoölogy, and a third for botany. Several large slabs have also lately been placed in the Zoölogical Lecture-room, for want of room elsewhere. The Ichnological rooms are nearly as full as they ever ought to be, containing not less than nine thousand tracks, by far the largest collection of this sort in the world. Indeed, as yet we know of no cabinet but this exclusively devoted to footmarks. Great care has been taken by the position of the tables, sometimes horizontal and sometimes inclined, and especially by the position of the large slabs on their edges, to make the light fall on them most advantageously. Without experiment most persons would suppose that the gallery ought to run along the south side of the main hall, rather than the north side, for the best exhibition of the specimens. But it is not so. The main principle of the arrangement was to place the specimens so that the light should fall obliquely upon their faces.

The following historical notices respecting this cabinet are copied from some private notes handed us by Dr. Hitchcock, who made this collection: —

"My collection of fossil footmarks was begun in 1835. For as soon as I had turned my attention to Ichnology (the science of tracks), I commenced the accumulation of specimens, and from that day to the present I have never ceased to gather in all which I could honestly obtain. For no other part of the cabinets have I labored so hard, or encountered so many difficulties. True, for some years at first, I had the field essentially to myself, and had I then been fully aware of its richness and extent, I might have secured a large amount of specimens at a reasonable rate. But as a consequence of what I published on the subject, prices ere long became fabulously high. Dexter Marsh, however, who had been most successful as a collector, ere

Cabinet at Vienna. From a paper on this subject by W. Haidinger, read before the Mathematical and Natural History section of the Royal Academy of Sciences Jan. 7, 1859, it appears that the collection numbered one hundred and thirty-seven localities; since which date others have been added, making as the present grand total one hundred and seventy-three, with a total weight of about 600 pounds.

long died, and his executors offered his specimens at auction. I could not see that fine collection scattered through the country without an effort to obtain some money to purchase some of them, and I adopted this plan. By working seventeen years, even without much money, I had got together a collection, which so good a judge as Prof. C. U. Shepard pronounced worth three thousand five hundred dollars, and whose cash value would not be less than two thousand dollars. In a circular to several benevolent gentlemen, I offered to present this to the College, if others would furnish me with six or seven hundred dollars with which to attend Marsh's auction. John Tappan first responded by a subscription of five hundred dollars; David Sears followed with an equal amount; Gerard Hallock with two hundred and fifty dollars; and several others with one hundred dollars; so that I went to the auction with nearly two thousand dollars in hand; and secured many fine specimens. Moreover, the stream of benevolence which was thus opened continued to flow for many years, till the beginning of the war in 1861, in fact, and the whole amount received was as much as three thousand eight hundred dollars. Had John Tappan's subscription been fifty dollars instead of five hundred, I think the maximum amount would hardly have gone over five hundred dollars. As it is, I have been enabled to spend nearly four thousand dollars, besides my own initial subscription. The following is a complete list of the donors. The donation of Samuel Appleton for the whole building was ten thousand dollars; and as the footmarks occupy nearly all its lower story, I place five thousand dollars against his name.

Hon. Samuel Appleton, Boston,	$5000
Edward Hitchcock, in specimens,	2000
John Tappan, Esq., Boston,	500
Hon. David Sears, Boston,	500
Mrs. Abbott Lawrence, Boston,	300
Roswell Field, Esq., in specimens, Gil,	300
Gerard Hallock, Esq., N. Y.,	250
William Miles, Esq., N. Y.,	200
Hon. E. P. Prentice, Albany,	150
John Clarke, Esq., Northampton,	100
Hon. Edward Dickinson, Amherst,	100
William Dickinson, Esq., Worcester,	100
John M. Doubleday, Esq., N. Y.,	100

James H. Welles, Esq., N. Y.,	$100
Hon. Jonathan Phillips, Boston,	50
Hon. Samuel Williston, East Hampton,	50
Hon. Albert H. Porter, Niagara Falls,	50
Prof. Edward Tuckerman, Amherst,	50
George Meriam, Esq., Springfield,	50
Hon. John Gray, Boston,	25
Dr. Nathan Allen, Lowell,	25
William Ropes, Esq., Boston,	25
Hon. Horatio G. Knight, Easthampton,	25
J. P. Williston, Esq., Northampton,	25
Edward Barrett, Northampton,	25
Gilbert A. Smith, Esq., South Hadley, in specimens,	25
Pliny Moody, Esq., South Hadley, in specimens,	25
Rev. Plinius Moody, Esq., South Hadley, in specimens,	25
	$10,175

"This is a noble list, and it is gratifying to have such names to endorse this enterprise. But these are only a select few out of the many whom I addressed; so that the work has been a laborious one, yet far more successful than I ever expected. I remember such a case as that of Mrs. Lawrence, the only lady on the list, with much pleasure. I was almost afraid to state the case to her, and I suggested that one hundred dollars was the maximum of my expectations; but the check returned was for three hundred dollars.

"But the labor and difficulty were only begun when the money was obtained. In no other enterprise of my life have I been obliged to work so hard and to exercise so much strategetic skill, to avoid paying exorbitant prices, and even to avoid defeat. The high prices paid at the auction (one slab sold for three hundred and seventy-five dollars) produced an impression of the great value of these relics throughout the valley, and if I only expressed an interest in a particular specimen, the presumption was that it was rare, and the price went up accordingly. I was obliged, therefore, to exercise a good deal of prudence and show some *sang froid*, or, with my small means, I could not make much headway. I worked as quietly as possible, with my plans locked up in my own breast, yet with inflexible resolution and perseverance, looking constantly to God for help. I felt a conviction that such a collection would illustrate a curious chapter in his providence towards our globe, and that the larger the collection the more fully would it be

illustrated. I expected myself to be able to make only a beginning; but I wanted to provide the means for my successors to carry forward the work, which they could not do if the specimens were scattered, no one could tell where, and the different varieties were not gathered together in some one cabinet. Large as the collection now is, I have often been pained to see very fine specimens taken out of my hands by those who could pay more for them than I could, and carried I know not whither.

"In such circumstances I have tried to be as economical as possible in the use of the money in my hands for this purpose. Whenever I could, I have myself gone to the localities and dug out the specimens. When not too large, I have transported them on my own business wagon. Again and again have I entered Amherst upon such a load, generally, however, preferring not to arrive till evening, because, especially of late, such manual labor is regarded by many as not comporting with the dignity of a Professor. I have not, however, in general, paid much attention to such a feeling, except to be pained by seeing it increase, because its prevalence is changing the character of the College, and driving away those who are obliged to do their own work.

"But though this has been a laborious work, it has been intensely interesting, or I should long since have abandoned it as not worth incurring so much of misrepresentation, opposition, and hostility as I have met. It was emphatically a new field, scarcely entered upon by European naturalists, and in this country, although far richer in materials, no one had gone before me. But as I pried open one after another the folded leaves of this ancient record, it revealed a marvellous history of the early Fauna of this valley. It was a new branch of Palæontology, whose title page had been written in Europe, but I had stumbled upon materials enough to almost fill the volume. Up to the present time I have been trying to spell out the hieroglyphics; but even now I presume the work is only begun. Success to those who come after me; and may they find in the cabinet, which I leave them, many curious archives which they shall decipher.

"A few words of ichnological history may here be desirable.

"The first tracks in stone noticed anywhere on the globe, so far as I know, were ploughed up by Pliny Moody, in South Hadley, in 1802, while a boy. This slab is now in our cabinet (No. $\frac{1}{2}^{6}$). But though the impressions were then spoken of as 'the tracks of poultry,' and of 'Noah's raven,' no account of them was given to the public, nor the attention of any scientific man called to them; and it was only after I had been for some time investigating the subject, that I accidentally learnt of the existence of this slab, and purchased it of the heirs of the late Dr. Dwight, of South Hadley. But it was undoubtedly dug up earlier than any fossil footmark on the globe that has been preserved.

"The first scientific account of fossil footmarks, and therefore the first real *discovery*, according to Dr. Paley, who says, 'he alone discovers who proves,' was given by Rev. Dr. Duncan, of Edinburgh, in 1828, of tracks at Annandale in Scotland. In 1831, Mr. Scrope found and described a few in England, of Crustaceans, and in 1834 Prof. Kaup described those of the Chirotherium in Germany.

"It now seems to be settled beyond reasonable doubt, that the Connecticut river tracks were brought into notice as follows: In March, 1835, Mr. W. W. Draper, of Greenfield, walking home from church with his wife, noticed on some slabs of flagging stone, lying by the side-walks, impressions, which he thus described to William Wilson, in front of whose house the slabs lay. 'Here are some turkey tracks, made 3000 years ago.' Mr. Wilson soon after showed them to Dr. James Deane, who described them to me by letter the same week, as 'the tracks of a turkey in relief,' and offered to secure the slabs for me if I wished, which he did, and they are now suspended in a frame table (Nos. $\frac{1}{1}^{8}$ and $\frac{1}{2}^{8}$) so as to turn on an axis, and show both sides. I studied the subject through the summer of 1835, and in January, 1836, published in the American Journal of Science and Art an account of seven species of tracks. In the six following years, including the paper just named, I published five papers in the Journal, containing over a hundred pages and twenty-six plates, describing thirty-two

species. Up to that time (1842) no one else had described a single species. I took the ground that these tracks were made by birds, and hence called them ornithichnites, or *stony bird-tracks.* But my views were not generally received by scientific men, even so far as to allow the impressions to be tracks at all. Yet in 1841, five eminent geologists, who had been appointed to examine the subject by the American Association of Geologists and Naturalists, reported that 'the evidence entirely favors the views of Professor Hitchcock.' A few years more and there was a general acquiescence in those views.

"Up to this time (1862), I have published about five hundred and fifty pages, three hundred and sixty of them quarto, with one hundred and sixteen plates, on the Ichnology of the Connecticut, in eleven communications in the American Journal of Science, one in the Transactions of the American Academy of Arts and Sciences, and two Reports to the Government of Massachusetts. In my first paper, I described seven species; in my Final Report on the Geology of Massachusetts, twenty-seven species; in my paper before the American Academy, fifty-two species; and in my Report on the Ichnology of New England, in 1858, one hundred and nineteen species. Other writers, also, particularly Dr. James Deane, Dr. John C. Warren, William C. Redfield, Esq., and Sir Charles Lyell, have given descriptions and illustrations of these objects; but as they have not attached names to the species, I cannot say how many they have described."

With these preliminaries from Dr. Hitchcock's notes, we now proceed to notice such of the interesting specimens as can be understood and appreciated without too much scientific detail. Such as would be glad to understand all the curious things in this cabinet, will find them detailed in the Report on Ichnology, whose publication by the Government of Massachusetts in such superior style, whatever be its merits, is a fine illustration of the liberality of the State towards scientific objects. How this act is appreciated in Europe may be seen in a review of the Ichnology in the North British Review.

As he enters the cabinet, the visitor had better pause at

the entrance, and take a general view of its contents. He will see several large slabs, and some small ones, placed on their edges, crosswise of the room, all covered with tracks of various sizes. He will here get a good idea of their appearance in the quarries whence they came. He will see, however, that on some slabs all the tracks are raised, or in relief, and all on others depressed, and he may not at first see the reason of it; for he would perhaps expect that all tracks would be depressed. But suppose an animal, as it trod on the soft mud (and thus the tracks must have been made), bent down the layers to the depth of several inches, and that mud should be hardened into stone, and these layers be split apart. The under side, if turned up, would show the tracks in relief, corresponding to the depression on the other side. And sometimes several layers of stone may be split apart in this manner, and thus a stony volume be formed having several leaves to it, which may be fastened together on the back, and open as a book. Quite a variety of this kind of literature may be seen in the cabinet, from the ponderous folio down to the tiny 24mo.

The tables and the upright and horizontal cases in these rooms are numbered from one to fifty; and these numbers form the numerators of fractions, while the individual specimens on the tables form the denominators in the description and in the Report on Ichnology. The numbering of the tables commences at the east or farther end of the hall, and proceeds westerly; then the upright cases on the left-hand side of the gallery are numbered the other way; then we come back again to the side room and pass around the walls, and finally into the lecture-room, where are a few large slabs. This order is somewhat irregular, but as the different animals that made the tracks did not walk along according to any zoölogical system, it is impossible to conform the arrangement of the tables to any such system. Upon every row of tracks, and for the most part upon every individual track, the name of the animal by which it was made is given in print. And though in many cases its nature is quite uncertain, yet the name is so constructed as to be equally good, whatever its nature turns out to be.

All the animals that made the tracks are comprehended in the New England Ichnology, under the general term *Lithichnozoa;* which means *stone-track animals.* These are sub-divided into ten groups, corresponding essentially to the great classes of animals, vertebrate and invertebrate, as described by zoölogists. Some of the groups, however, are modified in name to correspond to a curious fact, found to be true as to most of the old fossil animals, viz. that they were intermediate in character between two and sometimes three or four of the existing classes. Thus, our fourth group is called *Ornithoid Lizards*, or *Batrachians*, which means that though upon the whole they were probably lizards or batrachians, they had some characters now found in birds. We will now refer to specimens in the cabinet, where the visitor will see examples of the different classes.

Some, however, may visit the cabinet who doubt whether these impressions are tracks at all. We advise such to go first to the east part of the room, and look into the side case, No. 40, where they will see numerous specimens of the tracks of man, the dog, the crow, the snipe, etc., as well as rain-drops on hardened clay, from the banks of Connecticut river, in Hadley. In fact, we have on the clay a full counterpart of the tracks on stone.

While in this part of the cabinet the visitor will do well to look into the next case, No. 39, where he will see several varieties of rain-drops on stone, and some on bricks, for comparison. Larger specimens may be seen in other parts of the room, especially in the side room. Some of these are in relief, and others depressed, just like the tracks.

We advise the visitor, if he have time, to move about the cabinet with a view of looking at some of the numerous rows of tracks on the slabs, as for instance No. $\frac{9}{10}$ and $\frac{8}{1}$. These rows, with right and left feet, produce generally a strong conviction that they were made by the tread of animals over soft mud.

If the visitor goes back to the west door, and looks inward, he will have just before him a specimen on its edge, and others lying near by, with the label, *Nature's Hieroglyphics.* These are probably examples of mud cracked by drying, and the cracks subsequently filled by similar

mud. They are from New Jersey and Turner's Falls. A little to the right stands a table covered with glazed frames in the form of a roof, and nearly filled with *fossil volumes*, such as have been described, and the whole, therefore, labelled the *Stony Library*. Most of the volumes are two-leaved, but some have three or four leaves, and one even five. This, at the south end of the case, and spread open, shows two tracks extending through five layers of stone, each nearly an inch thick. It is the most remarkable example known, and cost some $35 at auction.

Just beyond the stony library stands a wooden frame with the two slabs (Nos. $\frac{18}{1}$ and $\frac{18}{2}$), from Montague. That first called Dr. Hitchcock's attention to Ichnology. They form a huge folio with two leaves and four pages.

A little beyond stands a small *centre-table* with a single track of Brontozoum giganteum upon it, in two leaves (No. $\frac{28}{1}$). This is the only case in the cabinet where the counterparts of this gigantic track are seen. No. $\frac{25}{3}$, however, shows one almost as large of Tridentipes ingens.

In contrast, may be seen in the side case, No. 36, a single example of a volume of two leaves of an insect track, almost too small for the naked eye. We have no other specimens of this sort.

Other volumes of various sizes will be seen in various parts of the cabinet, some bound and some unbound.

GROUP I.—MARSUPIALOID ANIMALS.

Marsupials, such as the kangaroo and the opossum, are the lowest in organization among existing quadrupeds or mammiferous animals, and these were the earliest quadrupeds that appeared on the globe. Marsupialoid animals are animals that resemble marsupials, but may not be such. Out of the fifty-five four-footed animals whose tracks are in the cabinet, only five are called in the Ichnology Marsupialoids. One variety is called *Cunoid Marsupialoids* (No. $\frac{29}{2}$), because the tracks considerably resemble those of a dog. A second variety is the *Ornithoid*, or bird-like Marsupialoids. Of these there are two species, Anomœpus major and minor.

To bring out the characters of these last tracks, has cost more labor than those of any other in the cabinet. Nearly all the peculiarities are exhibited on a remarkable slab in the side-room, No. $\frac{47}{1}$. At first view the slab seems covered over with the tracks of a three-toed bird, in four or five distinct rows, showing the right and left feet; but on one of the rows, after a succession of several three-toed tracks, without heels, suddenly two long-heel traces appear, attached to two of them, which are nearly opposite to each other, as if the animal had stopped and brought to the ground its long heels. Besides, a little in front, are two much smaller five-toed tracks, showing that the animal had small fore feet not usually employed in walking. After resting on its fore feet and heels, it resumed its usual mode of walking on the toes of its hind feet, leaving tracks exactly like those of a bird. Occasionally there is the trace of a tail. Moreover, in another place on the slab the animal seems to have gone forward by a leap with its hind feet; so that it seems to have had several modes of moving forward. Other specimens, such as $\frac{16}{4}$, $\frac{16}{14}$, and $\frac{19}{14}$, confirm these conclusions.

Anomœpus major (No. $\frac{1}{1}$ and $\frac{1}{7}$) is remarkable for the striking resemblance of its hind foot, independent of the heel, to a bird's foot, and for a peculiar tail trace, which consists of a heart-shaped impression, that is repeated at intervals (No. $\frac{20}{1}$), as if the animal lifted up a blunt appendage at each step or leap, and brought it down again.

The *Loricoid* Marsupialoids, or such as have feet on the plan of the crocodile, have left numerous small and beautiful tracks in great abundance, such as Nos. $\frac{26}{7}$, $\frac{26}{8}$, $\frac{26}{19}$, $\frac{26}{20}$. The specimens on the wall of the side room, Nos. $\frac{42}{3}$, $\frac{42}{4}$, $\frac{46}{5}$, show beautiful rows of these tracks, nearly on a right line, to make which must have required a long-legged animal, and could hardly have been made by a lizard or batrachian such as now live.

If the preceding were marsupials, and not lizards or batrachians, then probably some of the other twenty-five species in the cabinet with unequal feet were also marsupials, as is made probable in a paper published in the proceedings of the American Association for the Advancement of Science for 1860, p. 154.

GROUP II. — THICK-TOED BIRDS.

Fourteen species of them are described in the Ichnology whose tracks vary in length from two and five-tenths inches to eighteen inches. The toes are not only thick, but exhibit several rounded expansions, corresponding, it is supposed, to the phalanges of the toes; and their number (two on the inner, three on the middle, and four on the outer) corresponds to those of birds. We have been led of late to doubt whether there is not a mistake as to this matter; but if not, the argument is quite strong to prove these fourteen animals to have been birds. And even if this argument should fail, we think this conclusion would still be probable.

Brontozoum giganteum, or the giant Brontes, shows the largest of these tracks, and the cabinet abounds with them. $\frac{7}{1}$ and $\frac{5}{1}$ show rows of them from Northampton. Table 15 has numerous single tracks upon it. No. $\frac{15}{1}$ holds a gallon of water. $\frac{15}{2}$ was the first track of this species that was discovered, and was at first thrown away because it was not thought possible that so large a track could exist. But this specimen was afterwards figured in the American Journal of Science, and in Dr. Buckland's Bridgewater Treatise. Some good single tracks of this species may be seen on the walls of the side room. Its stride was from thirty to sixty inches; its height not less than twelve feet; and its weight from four hundred to eight hundred pounds. Table No. 7 shows the largest tracks and the longest stride of this species.

Near the middle of the room there is suspended from the ceiling the leg of the great Moa, or dinornis, lately discovered in the alluvium of New Zealand, where it may have lived within a few hundred years. The two upper bones, the femur and the tibia, are wooden models of bones in other cabinets. But the lower piece, the tarso-metatarsal and the foot, excepting three of the phalanges, are true bone, from New Zealand. Not far distant hangs the model of an egg of a still larger bird, the Aepyornis, from Madagascar; the original of which is in Paris. Both these birds must have been nearly as large as the brontozoum.

The smaller species of this group — some of them not much smaller — are scattered by hundreds through the cabinet. They are the most common, and upon the whole the most perfect, of all the tracks in the valley. Yet in the thousands that have been found, neither a fourth toe nor a fore foot have been noticed. Hence the conclusion seems very fair that the animals must have been three-toed bipeds. In the most perfect specimens, also, the toes show a definite number of expansions, as already mentioned, corresponding to the Grallatores among birds. The finest slabs for showing these parts are Nos. $\frac{9}{14}$ and $\frac{13}{4}$. The first shows forty-eight tracks of Brontozoum Sillimanium, six of Brontozoum exsertum, and three trails of an Annelid. The distinctness of the claws and phalangeal impressions is remarkable. It was from Middletown, Ct., where it has lain sixty years in the sidewalk; it cost one hundred dollars, and is, perhaps, the gem of the cabinet. No. $\frac{13}{4}$ was from Turner's Falls, and shows the phalanges finely; cost one hundred and fifty dollars. The Amblyonyx on this slab seems to have had winged claws.

On No. $\frac{4}{1}$ is an interesting row of Grallator cursorius, exceedingly resembling the tracks of a long-legged wading bird. It is apt to be overlooked.

There are a few examples in the cabinet where even the delicate striæ and papillæ on the animal's foot are visible on the track. One of them is on a single track from Wethersfield, Ct., of Brontozoum giganteum, No. $\frac{31}{22}$, where both striæ and papillæ are shown. No. $\frac{40}{5}$ exhibits distinctly the minute striæ running across the ball of a boy's foot, on clay from Hadley. But perhaps the best specimen is upon several tracks of the Anomœpus, on slab No. $\frac{47}{1}$. These specimens show how minute and exact is the information conveyed by these impressions.

Supposing the thirteen animals of this group to have been birds, and to be now tracking along the shores of the Connecticut, the smallest of them as large as a turkey, and the largest from twelve to fifteen feet high, two or three times as large as an ostrich! Would that we only had them in our cabinet! Yet they were once living contemporaries in this valley. Nay, the largest of them once

walked in flocks along the river's bank in Northampton, as is shown by their parallel rows of tracks.

GROUP III. — NARROW-TOED BIRDS.

Seventeen species of narrow-toed birds, with three or four toes, are represented in the cabinet according to the Ichnology. The evidence of their having been birds is not as strong as in respect to the last group, because no phalangeal impressions remain. Still some of the tracks cannot be distinguished from those of living birds; and if there were thick-toed birds in those ancient times, there were doubtless narrow-toed ones, as in existing nature.

The largest tracks of this group may be seen on slabs Nos. $\frac{14}{2}$ and $\frac{14}{3}$, which shows Argozoum redfieldianum, and Nos. $\frac{15}{13}$ and $\frac{25}{3}$, which is Tridentipes ingens.

The slabs of the Argozoum show, also, specimens of the fecal remains of the animal, usually called coprolite. Some detached specimens of the same may be seen in Nos. $\frac{39}{14}$, $\frac{39}{15}$, and $\frac{39}{16}$ of the upright cases. These are the only other relics of the Lithichnozoa besides their tracks that have yet been found. For although we have two examples of skeletons from the sandstone, they were found so far from any strata containing tracks, that there may have been no connection between the two facts.

Other slabs of supposed narrow-toed birds, of smaller size, may be seen on slabs Nos. $\frac{1}{4}$, Tridentipes insignis; $\frac{18}{1}$ and $\frac{18}{2}$, Tridentipes elegans; $\frac{32}{23}$, Platypterna deaniana; $\frac{39}{4}$, Platypterna gracilior; and $\frac{27}{6}$, Ornithopus gracilior.

GROUP IV. — ORNITHOID LIZARDS OR BATRACHIANS.

The most remarkable of these is the Gigantitherium caudatuum, on slabs $\frac{9}{9}$ and $\frac{9}{10}$. This track shows three huge fore toes, with a small lateral one coming out from the heel, and the animal walked nearly on a right line. We should suppose it a huge four-toed bird. But there is a distinct tail trace, showing that it could not have been a bird. Yet no fore foot has been found. It may have been a biped lizard or batrachian, or one with very small fore feet, which were seldom brought down to the ground.

"What shall we say of such a giant," observes Dr. Hitchcock, "combining perhaps the characters of most of the vertebrate kingdom; especially if, as yet appears, he was a biped! What being has been brought to light on the globe, or I might almost say in the dreams of mythology, more extraordinary than this ancient inhabitant of Massachusetts?" (*Ichnology*, p. 107.)

Nos. $\frac{1}{3}$ and $\frac{20}{6}$ show rows of Hyphepus fieldi; the latter, eleven tracks with a tail trace. The tracks have the same form as the Gigantitherium, but appear to have had a web. The foot is decidedly ornithoid in appearance.

No. $\frac{42}{5}$, in the side room, shows the hind and fore feet of Tarsodactylus, which had unequal feet, and its toes dragged as it walked, as did also the tail, all of which are seen on the slab. Its hind feet resemble those of a bird.

Still more so do the stout hind feet of the Apatichnus, a good specimen of which may be seen on slab No. $\frac{20}{6}$ in a row of twelve tracks. The small fore foot is so seldom seen that it was long entirely overlooked, and the animal supposed to be a bird; but it turns out to be only ornithoid, and was probably a lizard or batrachian.

Still more like a bird was the Plesiornis, as its name implies, seen on slabs Nos. $\frac{20}{7}$ and $\frac{19}{18}$. Here the three principal toes, both of the hind and fore feet, very closely resemble those of a bird; but the fore feet are somewhat smaller than the others. The toes of the hind feet of No. $\frac{20}{7}$ are also terminated by pellets instead of claws, like most frogs. Hence we call the animal an ornithoid batrachian.

In this place is introduced an anomalous track, quite unlike that of any living animal. It is Typopus abnormis, shown on slabs Nos. $\frac{19}{1}$, $\frac{19}{2}$, $\frac{19}{16}$, and $\frac{19}{17}$. The name means *type-foot*, from its resemblance especially to some Oriental languages, say the Syriac. Every other track in our specimens is turned aside from the line of direction, some fifteen degrees more than its alternate. "I was once," says Dr. Hitchcock, "showing the specimens to an eminent Boston physician, and inquired of him how he could explain this fact. 'The animal,' he replied, 'had its leg broken, and there were no good surgeons in those days to

set it.' This was just the reply I expected; since the same thought had been forced upon myself." (*Ichnology*, p. 106.)

GROUP V. — LIZARDS.

Probably some of the seventeen specimens of lizards described in the Ichnology as being in the cabinet by their tracks, may turn out to be batrachians; for it is not easy to distinguish between them by their tracks. Indeed, in the community generally, living lizards are not always distinguished from batrachians. The crocodiles and alligators are regarded as no more lizards than the newts and salamanders, although the naturalists call the latter batrachians.

The largest lizard designated by its tracks is the Polemarchus, Nos. $\frac{26}{15}$, $\frac{26}{16}$, and $\frac{26}{17}$, which means a leader in war; as he might have been if in other respects as well armed as his feet were. The track somewhat resembles that of a crocodile, but was much larger. It may have been the giant crocodile of Chicopee; for there was the track found.

The tracks of other and smaller lizards may be seen on Nos. $\frac{32}{22}$, $\frac{32}{23}$, $\frac{34}{11}$, and $\frac{34}{12}$, which are Plectropterna minitans; Nos. $\frac{22}{1}$, $\frac{32}{21}$, $\frac{41}{8}$, and $\frac{41}{9}$, Plectropterna gracilis; Nos. $\frac{33}{38}$, $\frac{33}{39}$, $\frac{33}{40}$, $\frac{33}{41}$, and $\frac{33}{42}$, Plectropterna augusta; Nos. $\frac{36}{42}$, $\frac{33}{45}$, and $\frac{33}{46}$, Plectropterna lineans; Nos. $\frac{27}{8}$, $\frac{31}{23}$ to $\frac{31}{30}$, and $\frac{31}{35}$ to $\frac{31}{42}$, Triænopus leptodactylus; Nos. $\frac{27}{10}$ to $\frac{39}{12}$, and $\frac{39}{8}$, Xiphopeza triplex; Nos. $\frac{6}{1}$ and $\frac{29}{6}$, Orthodactylus floriferus, a beautiful species; Nos. $\frac{23}{2}$, $\frac{23}{3}$, and $\frac{18}{2}$, Antipus bifidus, a singular but doubtful species; Nos. $\frac{13}{2}$, $\frac{20}{4}$, $\frac{31}{14}$, $\frac{37}{9}$, and $\frac{37}{10}$, Chimæra barrattii, etc.

GROUP VI. — BATRACHIANS.

Such specimens are arranged in this group as show a resemblance to the frog tribe. The singular and beautiful specimens shown on slabs $\frac{9}{1}$, $\frac{38}{14}$, $\frac{38}{15}$, $\frac{9}{16}$, $\frac{9}{19}$, $\frac{9}{12}$, $\frac{9}{3}$, etc., and which attract every one's attention, have been supposed to be the mud-nests of tadpoles, which are frogs in a larva

state. That tadpoles at this day do make precisely such holes in mud beneath the water, is proved by Nos. $\frac{38}{8}$ and $\frac{38}{9}$, which are dried mud, hardened by glue, scooped up from the bottom of a small pond in Hadley meadows, inhabited by tadpoles. The specimens in rock are from South Hadley Falls.

Nos. $\frac{3}{1}$, $\frac{4}{1}$, $\frac{4}{2}$, $\frac{4}{4}$, $\frac{4}{5}$ and $\frac{5}{14}$ exhibit the most gigantic of all the tracks, those of the Otozoum moodii. They are twenty inches long and thirteen to fifteen inches broad, covering more than a square foot of surface, and probably there was a web extending even beyond the toes. The long slabs, $\frac{3}{1}$ and $\frac{4}{1}$, show a succession of the right and left feet, one row depressed and the other in relief. The foot had four toes and they were terminated by pellets instead of claws. One slab, No. $\frac{5}{14}$, shows that the animal had small five-toed fore feet, though usually it walked like a biped on two hind feet. It also most probably had a tail. It may have been a marsupial; but the pellets of its toes look more like a batrachian. It was probably intermediate. Most of the specimens are from South Hadley, but the animal lived also at Portland in Connecticut, and at Turner's Falls.

"Imagine now a collection of Otozoums walking or sporting along the muddy shore; animals approaching the elephant in size, yet allied to the frog tribe, or perhaps the salamanders. At a little distance you can imagine a group of the Gigantitherium family; and still further on, a group of Brontozoums. Which of these giants would be acknowledged as entitled to the first place, we cannot decide. But should a contest have arisen at any time for the supremacy, and these several leaders should have summoned the numerous lesser tribes around them to their aid, it would require another Milton to describe the scene." (*Ichnology*, p. 184.)

The Selenichnus, or moon-track, so called, from its crescent shape, is well shown on Nos. $\frac{42}{7}$, $\frac{42}{8}$, and $\frac{44}{10}$. Only the hind feet are distinct; but a small fore foot of the S. breviusculus is shown on one specimen. This track is remarkable for the distinctness of the tail trace and the lunate form of the hind track.

If the visitor wishes to see other good examples of tail

traces, let him look at Nos. $\frac{50}{1}$, $\frac{50}{2}$, and $\frac{50}{3}$, in the lecture-room.

GROUP VII. — CHELONIANS OR TORTOISES.

There are no very striking tracks in this group, nor is their chelonian origin very certain. The fore and the hind feet of Ancyropus are shown on the different leaves of the volumes, Nos. $\frac{27}{7}$ and $\frac{27}{12}$, in the stony library. Nos. $\frac{35}{24}$ and $\frac{41}{39}$ are delicate tracks of the genus Exocampe. Nos. $\frac{26}{10}$, $\frac{19}{8}$, and $\frac{45}{8}$ show little more than the trails of the shell and feet of what are supposed to have been tortoises.

GROUP VIII. — FISHES.

Living fishes, as they swim near the bottom sometimes strike their fins against the mud or sand and leave furrows, sometimes striking only the crests of ripple marks. Nos. $\frac{20}{9}$ and $\frac{34}{26}$ look as if made in the same way. Kirby mentions a fish, "perhaps a Loricaria, which has a bony ray before the ventral as well as pectoral fins, and which creeps on all fours on the bed of the rivers, perhaps even when they are dry. These little quadruped fishes must cut a singular figure upon their four stilts." The siluroid fishes are well known for such habits, sometimes coming out of the water and passing over the dry land, and having a cavity in their heads for holding a supply of water. Perhaps Nos. $\frac{36}{8}$, $\frac{20}{6}$, $\frac{36}{51}$, and $\frac{36}{50}$ had such an origin, though no great confidence because its track can be felt in such an opinion.

GROUP IX. — CRUSTACEANS, MYRIAPODS, AND INSECTS.

At present it seems useless to attempt to distinguish between those different classes of animals by their tracks.

No. $\frac{10}{2}$ may have been a crustacean, like a lobster. We cannot doubt that it was made by some animal. This specimen Dr. Hitchcock took out of the sidewalk in Greenwich street, New York. We call the animal Harpagopus, resembles a harrow, or drag.

No. $\frac{13}{4}$ (Stratipes latus) is a larger animal of a similar kind, perhaps, from Turner's Falls. Its two rows of tracks

are twenty inches apart, and the width of the trackway twenty-seven inches. Though arranged as a huge crustacean, the true nature of this animal is quite doubtful.

No. $\frac{36}{16}$ (the Hamipes) is a smaller but very distinct track, with bifid extremities, like the stratipes. Nos. $\frac{36}{12}$, $\frac{36}{94}$, $\frac{36}{19}$, $\frac{36}{25}$, $\frac{36}{14}$, $\frac{36}{28}$, and $\frac{36}{17}$, may, in popular language, be called the tracks of insects. Yet none of them seem to have had more than four feet, while insects have six. No. $\frac{36}{17}$ is the smallest track in the cabinet; hence called Bifurculapes elachistotatus, — that is, *less than the least*, — a Greek phrase. These are so small that most persons would not notice them, though looking attentively at the slab. Yet the specimen shows four rows of tracks as distinct as any of the larger ones, which is true of nearly all these insect tracks. Whether they were made by insects, or crustaceans, or myriapods (allied to crustaceans), may be doubtful. But Nos. $\frac{36}{26}$, $\frac{36}{17}$ (Lithographus), $\frac{36}{11}$, $\frac{36}{33}$ (Hexapodichnus), and $\frac{36}{37}$ (Copeza), show six feet, and were therefore probably insects.

It may be interesting to state, that at length numerous specimens of an insect in the larva state have been discovered near Turner's Falls, by Roswell Field. It is figured and described in the Ichnology, on page 8, under the name of Mormolucoides articulatus, which Prof. Dana has lately changed, with Dr. Hitchcock's approbation, into *Palephemera mediaevus.* See specimens Nos. $\frac{48}{1}$, $\frac{48}{2}$.

GROUP X. — ANNELIDS, OR WORMS.

These embrace such animals as the earth-worm, or angle-worm, and many of the fossil specimens might easily be mistaken for modern ones, were they upon mud. Such are the Unisulcus, shown on Nos. $\frac{10}{6}$, $\frac{36}{22}$, and $\frac{36}{44}$. Other kinds, shown on Nos. $\frac{36}{19}$, $\frac{36}{40}$, $\frac{36}{49}$, $\frac{33}{35}$, $\frac{9}{14}$, $\frac{33}{36}$, $\frac{36}{36}$, and $\frac{36}{15}$, are most of them very peculiar, and much unlike existing Annelids.

"Such," says Dr. Hitchcock, in his Ichnology, "was the fauna, of sandstone days, in the Connecticut valley. What a wonderful menagerie! Who could believe such a register lay buried in the strata? To open the leaves, to unroll

the papyrus, has been an intensely interesting though difficult work, having all the excitement and marvellous developments of romance. And yet the volume is only partly read. Many a new page, I fancy, will yet be opened, and many a new key obtained to the hieroglyphic record. I am thankful that I have been allowed to see so much by prying between the folded leaves. At first men supposed that the strange and gigantic races which I had described, were mere creatures of the imagination, like the gorgons and chimæras of the ancient poets. But now that hundreds of their foot-prints, as fresh and distinct as if yesterday impressed upon the mud, arrest the attention of the sceptic on the ample slabs of our cabinets, he might as reasonably doubt his own corporeal existence as that of these enormous and peculiar races."

FOREIGN SPECIMENS.

The cabinet contains several specimens from other parts of our country and Europe, which may interest the visitor. One, No. $\frac{1}{2}\frac{0}{}$, from the Devonian rocks along Hudson river, has been already referred to. No. $\frac{2}{1}\frac{6}{4}$ is a specimen of the Batrachopus primævus, found by Dr. King in the carboniferous formation of southwestern Pennsylvania; evidently an animal approaching the frog tribe in structure. Nos. $\frac{3}{4}\frac{2}{8}$ to $\frac{3}{5}\frac{2}{0}$, are specimens of the Prototichnites discovered by Sir William Logan in the Potsdam sandstone of Beauhairnois, in Canada. These were doubtless crustaceans, and occur in what is usually thought to be in our country the oldest fossiliferous rocks. Nos. $\frac{2}{1}\frac{6}{1}$, $\frac{2}{1}\frac{6}{2}$, and $\frac{2}{1}\frac{6}{3}$, are specimens of the famous Chirotherium from Hildburghausen in Saxony, discovered just about the same time as the tracks in the Connecticut valley. Nos. $\frac{2}{2}\frac{6}{5}$ and $\frac{2}{2}\frac{6}{6}$ are specimens of the same kind of tracks from the Storeton quarries, near Liverpool in England.

THE ADAMS ZOÖLOGICAL CABINET.

For this cabinet the College is mainly indebted to the exertions of the lamented Professor C. B. Adams. At the

time of his death the Appleton Cabinet was not thought of, and these collections were scattered through three different rooms in the Chapel building; but so perfect was the arrangement of the specimens, that their order remains essentially the same as it was when Professor Adams left them.

Before describing the specimens, or their arrangement, we will notice the history of the collection; using, first, some notes prepared by Professor Adams in 1848.

HISTORY.

The materials with which the Zoölogical Museum of Amherst College has been commenced, were obtained from the following sources: 1. A legacy of Sylvester Hovey, formerly Professor of Mathematics and Natural Philosophy in this College. This legacy consisted of about 700 species of shells, with numerous duplicates; and by exchanging the latter, the number of species was raised to 1000, all of which were therefore virtually the gift of Prof. Hovey. 2. Donations of a few, or of individual specimens from the students, alumni, and other friends of the college. One of the most valuable was the large Dolium melanostomum, presented by the late Hon. William Richards, of the Sandwich Islands. Of this magnificent shell but one other specimen, so far as the writer can learn, is known to science. Another valuable donation was a box of the large and beautiful insects of Batavia, by Capt. Samuel R. Gerry, of Marblehead; also a collection of corals and shells from Ceylon, by Rev. John C. Smith, of Ceylon, through Professor Snell. These corals are mostly of large size, and all of them are in a perfect state of preservation of all the details of sculpture. President Hitchcock has also presented a fine collection of sea-fans, sponges, etc., of a great variety of forms, which were collected at Key West, by Dr. Blodget, formerly of this town. A few skins of foreign birds were presented by Rev. Henry J. Van Lennep, of Constantinople. 3. The collections which belonged to Professor Adams, and which had been made during a period of twelve years by personal collection, exchanges, and purchases.

These collections included the following materials: —

IN ZOÖLOGY.

Of Vertebrated Animals: A few stuffed specimens of mammals and of birds.

About 200 specimens of reptiles and fishes, mostly from the United States and Jamaica, embracing about 60 species.

Of Mollusca: A series of the shells of Jamaica, 400 species, containing about 10,000 individuals.

A general series of shells, 4400 species, represented by about 500,000 individuals, including a few of the animals of this division, with a manuscript systematic and numerical catalogue of most of the names, localities, etc., and about 300 copies of a printed catalogue of the European and North American species.

Duplicates for Exchanges: 1. Of Jamaica shells, an indefinite number, perhaps a million individuals, of which about 10,000 are of species which are in great demand for exchanges. 2. Several hundred thousand of North American shells. 3. Several hundred of European shells. 4. Exotic shells (i. e. neither European nor North American), about 3000 specimens.

Of Insects: 770 British species, mostly Coleoptera, named by Edward Doubleday, Esq., Entomologist of the British Museum.

About 150 species North American Cincindelidæ and Carabidæ, named by Dr. T. W. Harris.

Three hundred species of miscellaneous Coleoptera, named by Dr. J. G. Morris.

About 10,000 specimens of North American insects not named or arranged.

About 10,000 specimens of North American insects placed in the hands of Dr. Harris to be named.

Of Crustacea: About 100 specimens of 20 species, mostly from Jamaica.

Of Echinodermata: About 100 specimens of 20 species, mostly from Jamaica; a valuable collection.

Several corals, sponges, etc., mostly from Jamaica.

A Spongia patera from Singapore.

IN BOTANY.

About 1000 species, mostly from the Middle and Western States, with some exotic species, named and arranged in the natural orders.

A large collection of British plants, from E. Doubleday, Esq.

Miscellaneous specimens of tropical plants from Jamaica, for illustrations in class exercises.

IN PALÆONTOLOGY.

About 250 fossils, from Germany and from the Southern States.

APPARATUS OF NATURAL HISTORY.

Eighteen cases, containing 372 drawers. Insect boxes, nets, 10,000 insect pins, etc. Several gross of vials, tubes, etc., for small shells, boxes for same, with a dredge for marine objects.

BOOKS OF NATURAL HISTORY.

Monographia Apum Angliæ; Hanley's Continuation of Wood's Index Testaceologicus, about $20; Murchison and Verneuil's Geology of Russia, $46.50; Proceedings of Zoölogical Society, London, $20; Owen's Memoir of Mylodon, $10; Jones's Animal Kingdom; Forbes's Star Fishes; Boston Journal of Natural History, $24; so much of Keiner's Iconographia of Recent Shells as has been received up to this date; this book has cost $175. In short, such of the above, and the remainder of my books of Natural History, as are not in the College Library.

The means by which this private collection (valued at $5000) was obtained, it now seems necessary to describe.

The collections obtained in person were made in this State, mostly in the eastern part, at various points of the coast, from Plum Island to New Bedford; second, in Vermont, mostly in the valley of Lake Champlain, a region which is not surpassed, probably not equalled, in zoölogical riches, by any other part of the world in the same climate;

and third, in the Island of Jamaica. Small collections were also made in Maine, New York, Missouri, etc. All the insects, with the exceptions above specified, all the Jamaica shells, and most of the North American marine shells, were obtained by this means.

Collections, by exchanges, have been made in a correspondence with about fifty naturalists and collectors in England, Bremen, Bavaria, Baden, France, Sicily, Greece, Persia, Hindostan, the Sandwich Islands, in Jamaica, and in ten of the United States. The most valuable additions have been made by the University of Heidelburg, through Professor H. J. Bronn, the distinguished palæontologist. In exchanging North American for European shells, with this university, the rule of exchange has been for each party to send an equal number of species, and in the total of specimens not exceeding over twenty-five specimens in any one species. The value of this exchange is due to this rule, in connection with the long standing of the correspondence. The most common species have been exhausted long since, and those which are more rare are now requisite in its progress. By this means have been obtained nearly all the species of the shells of the southern half of Europe which exist in the cabinet of that university, in addition to the numerous others received from other correspondents. Another valuable correspondent has been that prince of collectors, H. Cuming, Esq., of London, whose personal collections along the western shores and islands, and in the western countries of South America, in the Philippine Islands, etc., mostly, although not exclusively, of shells, have not only not been equalled by those of any other naturalist, but have doubled the whole number of species previously known to science. To Mr. C.'s liberality in exchange, the collection was indebted for the most beautiful and valuable part of the land shells, viz. most of the Philippine species of the genera Bulimus and Helix. An excellent print of this gentleman may be seen on the south side of the Zoölogical Cabinet.

Mr. Doubleday, the Entomologist of the British Museum, has been mentioned, from whom the fine collection of British Coleoptera was obtained, in exchange for a suite of the

shells of Jamaica. Mr. Henry Dimond, of Honolulu in the Sandwich Islands, has also been a very liberal and valuable correspondent, having furnished such an extensive series of the shells of those islands as none but an experienced collector and naturalist could have procured, with such numbers of duplicates as not only to enrich the collection with numerous varieties of each species, but also to furnish materials for other exchanges. For the deep-sea species of the shells of New England we have been indebted to J. W. Mighels, M. D., formerly of Portland, now of Cincinnati, who furnished a series scarcely equalled in value by his own. To J. G. Anthony, Esq., of Cincinnati, Col. A. Bourne, of Chillicothe, O., Lieut. John H. Allen, formerly of Chillicothe and now of Baltimore, and especially to Rev. J. B. Lindsley of Nashville, Prof. Adams was indebted for the means of illustrating most of the beautiful and numerous species of the shells of the Western States, with very numerous varieties of each. Did our limits permit, we should be happy to mention, with high commendation, numerous other correspondents.

A large portion of the shells of the East Indies, and many from the Polynesian Islands, were obtained by purchases from dealers, and from seamen and their friends. Formerly great numbers were brought home by seamen, and by them given away or sold for small sums. But for several years past the number brought in has greatly diminished, owing in part, it is said, to the extravagant sums paid for these objects by officers in the French and especially in the English navy.

The donations made to this collection while it was private were inconsiderable, and bear no proportion to those which were made from it.

Subsequently to the original offer of this collection, — and before the opening of the Zoölogical Museum, by about seven hundred species of the Coleopterous insects, named by Dr. J. L. LeConte, of New York City, whose well-known accuracy and extent of knowledge in this most difficult branch of Natural History has thus greatly increased the value of this portion of the collection, — the large and valuable collection of insects which had been for

several years in the hands of Dr. Harris for a similar purpose, was obtained, with a few of the species named, but a large portion had entirely perished. With duplicates in the above collections the Curator has procured seventy specimens of sixty-six species of Massachusetts birds from Dr. Simeon Shurtleff, of Westfield, an alumnus of the class of '32. These were prepared and mounted by Dr. S., in a style which requires no other praise than exhibition. The usual processes of exchange have also resulted in the addition of a few hundred species of shells.

CONDITIONS OF PROFESSOR ADAMS'S GIFTS.

Several important conditions accompanied this valuable gift of Professor Adams, which are presented in the following letter to President Hitchcock: —

MIDDLEBURY, VT., Oct. 7, 1847.

REV. AND DEAR SIR: — On the 23d of August last I prepared for you a statement of my collection of books and specimens in natural history, which I propose to give to Amherst College, on certain conditions; which conditions were to be subsequently matured. Having reflected further on this subject, I now make the offer of the property named in that communication as a gift to Amherst College, on the following conditions: —

1. A fund not less in value than the above-mentioned gift, viz. $5000, or more, shall be established.

2. The income of this fund, and such additions as may be made to it, shall be used forever for increasing the collections of books of natural history and of specimens in natural history belonging to Amherst College.

3. This expenditure shall be made by myself during my official connection with the college; and subsequently by the officer or officers of instruction who shall have the charge of the department of natural history, and shall be subjected to such regulations as the Trustees of the College may deem requisite to secure its faithful appropriation to the objects specified above.

4. The words "increase of books and specimens" are not intended to include the care and exhibition of the same; but this may be included in case the general treasury of the college shall be embarrassed with debt.

5. So much of the income as shall not be expended within three years after it accrues shall be added to the principal.

6. This fund shall be established on the first day of February, A. D. 1848.

The gift, with these conditions, is made with a view to contribute in some small degree to the exhibition of the glorious plan of creation, especially of organic beings, as this exists in the mind of the Creator.

C. B. ADAMS.

REV. EDWARD HITCHCOCK, LL.D.,
President of Amherst College.

SUBSEQUENT HISTORY.

Professor Adams, in 1847, removed to Amherst, and immediately began to labor for the increase of the Zoölogical Cabinet. Every spare moment was devoted to this object with an untiring energy. The greatest exertion was spent upon perfecting the conchological part of the cabinet; and he succeeded so well that at the time of his death, in 1853, it was considered one of the finest collections in the country. Indeed it is only recently (1861) that a similar notice of it has been made, in a history of American Conchology, by George W. Tryon, Jr., member of the Academy of Natural Sciences of Philadelphia. The following extract from the *American Journal of Science and Arts* (March, 1862), will give the substance of this notice: —

"The splendid collection [of mollusca] belonging to Amherst College is a noble monument of the unflagging assiduity and scientific attainments of the late Professor C. B. Adams, who formed it. It embraces types of all his species, and full suites of the shells of the various West India Islands and of Panama. It is esteemed by competent judges the most valuable collection for study in the United States."

The number of new species of mollusca described by Prof. Adams was seven hundred.

Besides the ordinary exchanges, Professor Adams made an excursion to Panama and Jamaica, subsequent to his connection with the College, and brought back with him large scientific treasures. This was in the winter of 1849–50, and the results of his investigations upon the Panama shells were published in the Annals of the New York Lyceum of Natural History, an octavo volume of three hundred and twenty-five pages. During six weeks' exploration there he collected forty-one thousand eight hundred and thirty specimens of five hundred and sixteen species of mollusca, besides many radiate animals. His collections made in Jamaica were no less extensive.

Another excursion to the West India Islands was planned, and Prof. Adams had begun to collect upon the the Island of St. Thomas, but his early sickness and death put an end to his work. By this date (1853) the

collection of mollusca had attained the number of eight thousand species.

After Professor Adams's death the zoölogical department was transferred to Professor W. S. Clark, who labored efficiently for its weal, so far as his time and the means at his command would permit. All the larger stuffed specimens of the mammalia, as well as the botanical collections, and many other specimens, were procured by him. During his administration the specimens were removed from the three rooms in the Chapel, in which they had been exhibited, and placed in their present location. Professor Clark also placed upon the walls of the Zoölogical Cabinet and the lecture-room various large paintings, designed to illustrate botany and zoölogy.

In 1858 the present curator was appointed to take charge of the department of zoölogy, and the results of his labors have been already noticed in his Preliminary Report.

METHOD OF ARRANGEMENT.

There are two sorts of cases in the Zoölogical Cabinet, the horizontal and the upright. The former contain only the insects and shells of the mollusca. The latter contain specimens of all the branches of the animal kingdom, arranged in scientific order, except where a departure is made for the convenience of accommodating large specimens.

The specimens in the upright cases are arranged according to the following system of classification. The lowest orders begin at the northeast corner of the room, and in proceeding westwardly the observer will inspect the next higher classes in regular succession.

I. PROTOZOA.

Class 1. Amorphozoa, the sponges; Class 2. Foraminifera, the rhizopods; Class 3. Infusoria, including most of the animalcules. These are all confined to the first case.

II. RADIATA.

Class 1. Polypi, with two orders; (*a.*) Halcyonoidæ, the

sea-fans; (*b.*) Actinoidæ, or stony corals generally. These two orders occupy the next two cases.

Class 2. Acalephæ, with three orders; (*a.*) Hydroidæ, or fresh water polyps; (*b.*) Discophoræ; (*c.*) Ctenophoræ, — band (*c.*) being known as jelly-fishes. Class 3. Echinodermata, with four orders; (*a.*) Crinoidea, or crinoids; (*b.*) Stellerida, or star-fishes; (*c.*) Echinidæ, or sea-urchins; (*d.*) Holothuriæ. These two classes occupy the fourth case.

III. MOLLUSCA.

Class 1. Accephalata, with four orders; (*a.*) Bryozoa; (*b.*) Brachiopoda; (*c.*) Tunicata; (*d.*) Lamellibranchiata. Class 2. Gasteropoda, with three orders; (*a.*) Pteropoda; (*b.*) Heteropoda; (*c.*) Gasteropoda typica. Class 3. Cephalopoda, with two orders; (*a.*) Tetrabranchiata; (*b.*) Dibranchiata.

In the horizontal cases the classification adopted is different. The objects are arranged according to the Lamarckian system. The following is its outline, beginning at the highest part of the series and descending: —

Class 1. Cephalopoda, order (*a.*) Dibranchiata with two families, octopidæ and sepiidæ; (*b.*) Tetrabranchiata with two families, nautilidæ and ammonitidæ.

Class 2. Gasteropoda, with three orders; (*a.*) Trachelipoda with twenty-one families, viz. cyprædæ, mitridæ, purpuridæ, magilidæ, conidæ, strombidæ, muricidæ, turbinidæ, littorinidæ, halotidæ, vermetidæ, tornatellidæ, janthinidæ, naticidæ, neritidæ, melanidæ, paludinidæ, physidæ, cyclostomidæ, helicidæ, and limacidæ; (*b.*) Gasteropoda typica with ten families; aplysiidæ, bullidæ, fissurelidæ, umbrellidæ, dentalidæ, patellidæ, phyllididæ, doridæ, eolidæ, and calyptræidæ; (*c.*) Heteropoda with one genus, carinaria.

Class 3. Pteropoda, with two genera, cleodora and hyalaea.

Class 4. Conchifera, with two orders; (*a.*) Unimusculosa with three families, ostræidæ, pectenidæ, and aviculidæ; (*b.*) Bimusculosa with seventeen families, viz. mytilidæ, tridachnidæ, hippuritidæ, chamidæ, unionidæ, arcidæ, cardi-

idæ, venidæ, cyrenidæ, tellinidæ, petricolidæ, mactridæ, thracidæ, myidæ, solenidæ, pholadidæ, and aspergillidæ.

Class 5. Tunicata.

Class 6. Brachiopoda, with two orders; (*a.*) those animals having an articulated hinge to their shells, and (*b.*) those with an unarticulated hinge.

Class 7. Cirrhopoda, with two orders; (*a.*) Pedunculata; (*b.*) Sessilia.

IV. ARTICULATA.

Class 1. Vermes, or worms, with three orders; (*a.*) Trematoda; (*b.*) Nematoidea; (*c.*) Annelida.

Class 2. Crustacea, with five orders; (*a.*) Rotatoria, or the wheel animalcules; (*b.*) Cirripedia, or the barnacles; (*c.*) Entomostraca; (*d.*) Tetradecapoda; (*e.*) Decapoda, the more common crabs and lobsters.

Class 3. Insecta, with three orders; (*a.*) Myriapoda, the millepedes, etc.; (*b.*) Archnida, the spiders; (*c.*) Insectæ, the true insects.

The two most northern rows of horizontal cases contain Articulata, mostly arranged by Professor Adams. The following is the classification of the insects adopted by him.

Class Insecta. Orders: (*a.*) Coleoptera, the beetles; (*b.*) Forficulidæ; (*c.*) Orthoptera, grasshoppers; (*d.*) Thysanoptera; (*e.*) Neuroptera, dragon-flies; (*f.*) Tricoptera, case-worm flies; (*g.*) Hymenoptera, the bees, wasps, etc.; (*h.*) Strepsiptera, the wasp-flies; (*i.*) Lepidoptera, the butterflies, etc.; (*j.*) Homoptera; (*k.*) Heteroptera; (*l.*) Diptera, the fleas; and (*m.*) Aphanoptera, or the lice tribe.

V. VERTEBRATA.

Class 1. Myzontes, with two orders; (*a.*) Myxinoida; (*b.*) Cyclostomata.

Class 2. Fishes proper, with two orders; (*a.*) Ctenoids; (*b.*) Cycloids.

Class 3. Ganoids, with three orders; (*a.*) Coelacanths; (*b.*) Acipenseroids; (*c.*) Sauroids. The following are also placed here for the present: the Siluroids, Plectognaths, and Lophobranches.

Class 4. Selachians, with three orders; (*a.*) Chimæræ; (*b.*) Galeodes; (*c.*) Batides.

Class 5. Amphibians, with three orders; (*a.*) Cæciliæ; (*b.*) Ichthyodi; (*c.*) Anura.

Class 6. Reptiles, with four orders; (*a.*) Serpentes; (*b.*) Saurii; (*c.*) Rhizodonts; (*d.*) Testudinata.

Class 7. Birds, with four orders; (*a.*) Natatores; (*b.*) Grallæ; (*c.*) Razores; (*d.*) Insessores, including Scansores and Accipitres.

Class 8. Mammalia, with three orders; (*a.*) Marsupialia; (*b.*) Herbivora; (*c.*) Carnivora.

Most of the species have been, and it is to hoped that nearly all will soon be, labelled. Each label contains the name of the species following the initial of the genus, with citation of the original author of the specific name, the name of the place or region in which the specimens were obtained, and the name of the donor. Other circumstances, of periods of growth, varieties, etc., are indicated in the label. Each species has a separate label; and when a species is represented by varieties requiring separate notice, or by specimens from different localities, the specimens of each of such varieties and localities are labelled.

The geographical distribution of the species is approximately indicated by eight different colors of labels, which represent eight divisions of the earth's surface. These divisions are, the North American, the West Indian, the South American, the Pacific, the East Indian, the West African, the Siberian, and the European regions. The colors assigned to each of these zoölogical provinces may be seen on a map of the world.

Description of the Specimens.

The first thing that attracts the attention of the visitor is the paintings upon the walls. Upon the west end of the room is represented an elephant, in the midst of tropical scenery. It appears to the best advantage when viewed from the east end of the room. So, too, the representations of Arctic scenery, and of a western buffalo hunt, over the stairs, appear best from the west end of the room. Upon

the north side of the room are represented a South American anaconda attempting to "charm" a parrot, and the huge African ape, the gorilla, the nearest approach of the animal kingdom to man. Inside of the large glazed case, near the stairs, is a representation of the scenery of a Northern winter, in which a moose is located. When this painting was executed, only a solitary moose occupied the case; but now, since the accumulation of specimens, the scene is not so appropriate.

This case is now devoted to the sub-order Ruminantia, or those animals that chew the cud. The two largest specimens are the American moose, Alce Americana, *Jardine*. The stuffed skin is from Connecticut lake, N. H., while the skeleton is from Ashland, Me., in the latitude of Quebec. The bones were procured by Rev. M. R. Keep, of Ashland, and, after being cleaned, were mounted by Prof. Edward Hitchcock, Jr., who has also mounted the greater part of the skeletons in the cabinet, — particularly the larger ones, — some of which are only deposited by him.

The beautiful deer, the most common one in this country, the Cervus Virginiana, *Boddaert*, is from New York. The skeleton is from the West, and was presented by A. D. Phillips, Esq., of Deerfield. A series of the horns of the deer, showing the progress from year to year; also their appearance, when covered with hair and flesh, in their annual growth, are well shown by other specimens. Still other specimens, are the skull of the Indian ox (East Indian) presented by Rev. Edward Webb, horns of the American buffalo, a musk deer from Java, etc.

PROTOZOA AND RADIATA.

In the first upright case, to the left of the ruminant animals, are the Protozoa, in which will be seen one hundred and twenty-seven specimens of sponges, etc., of various forms and sizes. One very large bill-shaped specimen is worthy of special notice. These sponges have not yet been named.

In the second case are the Halcyonoid corals, or the sea-fans, seventy-two specimens. Many persons would think

these specimens to be plants. They are some of the compound structures known as Zoöphytes, *plant animals;* so called, because they so greatly resemble plants. An immense number of minute animals live all over their stalks and branches, which, by their united action, deposit animal and calcareous matter, taking the shape of a growing tree, or other vegetable. If one part of the living dome, or house, be broken off or injured, all the animals in the vicinity will be affected also. Many of these fans are very beautiful, and exhibit very bright colors. They are largely from the West India Islands and the Florida Keys.

In the third case are the Actinoid coral domes, or what are commonly known as coral. There are also Zoöphytes, but are higher in the scale of animals than the Halcyonoids. The two hundred and ten specimens of them in the case exhibit all the more common varieties, and some of them are very beautiful. They are mostly from the same localities as the Halcyonoids.

In the fourth case are the Acalephs and Echinoderms. Very few of the former are preserved, as it is almost impossible to preserve them. The "Portuguese man of war," on the upper shelf, will give some idea of the class. Upon the two lower shelves are the Echinoderms, largely from Jamaica and Panama. Few marine animals appear more curious, to persons not familiar with the coast, than these singular bodies, completely covered with vertical spines. Those with the larger solid spines are not commonly preserved in spirit; hence the spines are separated from the body. But one specimen of this *acrocladia,* of a purple color, may be seen in a bottle, which will give an idea of the original appearance of the others. Upon the middle shelf is a valuable collection of Star-fish and Ophiurans (Stellinda), largely from Jamaica and Panama. Both the star-fishes and sea-urchins were named by Prof. Agassiz, and a number of new specimens obtained from him by exchange. The Holothuridæ appear like great clumsy worms, and may be seen in bottles upon the upper shelf. In this case are 268 specimens of Echinoderms, 153 of Star-fishes, and 38 of Holothuridæ and Acalephæ.

MOLLUSCA.

The fifth case is devoted to the Mollusca, to specimens of the animals themselves, in connection with their shells, and to large specimens, too large to be admitted into the horizontal cases. Upon the lower shelf are two valves of the great Tridachna gigas, the largest of all mollusca, and such as are used in European cathedrals as vases to hold holy water. These specimens are seven inches deep. Although the two parts are opposite valves, and nearly fit, they are odd valves, one weighing 102½ lbs., and the other 125½ lbs. The entire shell to which the latter belonged, must, therefore, have weighed about 250 lbs., half the weight of the largest specimen that has been seen.

Upon the second shelf are several large shells, among which is an unusually large specimen of the Fusus aruanus, which is the largest of the univalve shells. Upon the third shelf are a large number of molluscous animals, mostly deposited by Professor Shepard; also an ornamental basket, prepared by George H. Coit, an alumnus of the class of 1852. A few specimens may be seen here of the eggs of large land shells, about as large as the eggs of the warblers among birds, upon the opposite side of the room. It may seem strange to some that snails should lay eggs; but this manner of reproduction is by no means confined to birds, since, in one way or another, it is the normal mode among all the classes of the animal kingdom. Upon the upper shelf may be seen a few specimens of Cephalopoda, or cuttle-fishes and squids.

ARTICULATA.

The sixth case is devoted to Articulata. Upon the two lower shelves may be seen specimens of the nests of the hornet, yellow wasp, and Ceylonese spiders. The latter are the most interesting, consisting of a long cylinder of earth, having a lid at the upper end, which is closed whenever the inhabitants are threatened by an enemy, or are indisposed to receive their friends. Upon the third shelf are numerous dried specimens of hermit crabs and king crabs.

The latter (Limulus polyphemus) are interesting, because they are the nearest approach of living animals to the ancient Trilobites, so abundant in the early periods of our planet. Upon the upper shelf are numerous specimens of tape-worms, hair-snakes, centipedes, millipedes, scorpions, spiders, crabs, etc. A specimen of a crab, in a glass case, is interesting on account of its collector. It was obtained by Rev. Henry Lyman, who was murdered by the Battas in 1834. Quite a number of other specimens in the cabinet were presented by the same gentleman, which were collected by him among those inhospitable isles.

FISHES.

The next two cases are occupied by what the older zoölogists called Fishes, but which are now subdivided into several classes, as given above. Upon the lower shelf of the seventh case may be seen a large sturgeon, a number of dried South Carolina and West India fishes, the vertebrae of a shark, etc. Upon the second shelf is a large number of dried and stuffed specimens of American fish, among which is the gar-pike; this, with the alligator gar above, are representatives of ancient Ichthyic animals, now mostly extinct. They have the heterocercal tail, or the lobes of unequal size, as was the case with all the fish earlier than the Triassic period. The alligator gar is a beautiful animal, upon the third shelf, and is from Lake Pontchartrain, near New Orleans. Upon the same shelf is a large number of Jamaica fishes preserved in spirit, the sword of the sword-fish (by whose side is placed a small head of the same species, in order to illustrate the size of the larger one), the saws of the saw-fish, pipe-fish, large eels from the Indian ocean, etc. The jars upon the upper shelf contain Jamaica fishes chiefly, among which is the curious hammer-headed shark.

On the lower shelf of the eighth case is a large number of tails of the sting ray, with a small shark, etc. Upon the second shelf are sharks' jaws, a shark from the Indian ocean, and a ray-fish from the same waters. This is a small specimen, although quite large, as may be seen by

comparing its tail with the tails of the sting ray below, which came from a similar animal. Upon the next shelf are more sharks' jaws, among which is the jaw of the Carcharias Atwoodi, from Provincetown, an animal very rarely found in our waters, — the true man-eating shark. Here are many specimens of the Diodon, a curious animal, having protuberances, like horns, in front; also the sea-hedgehogs, which must be very uncomfortable for intimate friendship. One can, by examining the countenances of these formidable animals, easily trace resemblances to human faces. Upon these two shelves are many fishes from Lake Champlain and the Connecticut valley, in spirit, the former presented by Mr. Averill, the generous proprietor of the Highgate Springs in Vermont. More Lake Champlain fishes appear upon the upper shelf, in company with diodons, dog-fish, rays, etc. We should not forget to notice the Echeneis maceratus, which is a parasite of the shark. One can easily see that his mouth is fitted only to suck out the juices of other animals in a parasitic way.

AMPHIBIA AND REPTILES.

The ninth and tenth cases are occupied by Amphibia and Reptiles. Upon the lower shelf of the ninth case is a large quantity of frogs and toads in spirit, a frog's skeleton from Europe, salamanders, the skin of an immense boa-constrictor from southeast Africa, etc. A Menobranchus from Cayuga lake, N. Y., represents that extraordinary group of reptiles which retain through life their beautiful feathered organs of aquatic respiration. Upon the second shelf is a small alligator, with several of the young, and a couple of eggs; also a series of Amphibians from Pennsylvania. A large number of snakes occupy the third shelf, among which is a beautiful skeleton and stuffed specimen of the South Carolina rattlesnake. The identical skeleton belonging to the stuffed specimen lies by its side; also several loose fangs. The shape of the mouth, also the position of the fangs, as well as their structure, may be clearly seen in these specimens. In the bottles adjacent are other rattlesnakes, particularly several from the vicinity of Am-

herst. Other interesting objects are the heart of a boa-constrictor, the black snake, and one or two tropical snakes. Upon the fourth shelf are snakes enough, one would think, to satisfy almost any person, except a naturalist, who, like a miser, never has enough until he has the whole. These specimens are from all quarters of the earth, but most of them are without names. In due time they will all receive names, — it may be before this edition of this "Guide Book" is exhausted.

In the next case, upon the lower shelf, may be seen a large specimen of a Southern alligator, and by his side his skeleton. Upon the second shelf is the skeleton and skull of the large green edible turtle, and near him preserved specimens of medium-sized snapping turtles, and terrapins of various kinds. An interesting series of the Nanemys guttata shows the different sizes of the animal at different periods of its growth. Other turtles appear upon the second shelf, among which are two specimens of the Psammobates radiata from Madagascar, a very large snapping turtle, turtles' eggs from the temperate and tropical climates, most of our common turtles, a small specimen, in a bottle, of the Sphargis, or leather turtle of the tropics, etc. Upon the upper shelf are numerous specimens of lizards of all sizes, and from all parts of the world. Among them are the so-called "horned toads," from Texas, etc., which, though common in their native regions, are objects of curiosity to most persons. Here is the Scincus fasciatus, *Linn.*, a very rare specimen. Chameleons from Jamaica and Africa are numerous. Many of the jars are crowded with a hash of different kinds of Jamaica lizards, which will be very valuable in making out exchanges, particularly with European museums.

MAMMALS.

For convenience the mammals are placed in the cases before the birds, although higher in the scale of being. In the first case of mammals are many miscellaneous specimens of bones, skulls, teeth, etc. On the lowest shelf are three vertebrae of whales, two pieces of whalebone, the cervical vertebrae of the Delphinus melas, the skin of a wood-

chuck, having remarkably long teeth, etc. Upon the second shelf are placed a number of bats, mostly dried, but some preserved in spirit; as for example, several Eolian bats, which were captured in a cave eighteen hundred feet above the base of Mount Eolus, in Dorset, Vt., in 1860, when the class of 1861 gave the name to the mountain. Tusks of the walrus, the skin of an ermine, horns of a goat, teeth of a whale, of the extinct species of the horse, of the wild boar, etc., are also exhibited here. Upon the third shelf the variety is greater. Here may be seen the skulls of many small animals; the teeth of many more, such as the whale, camel, elephant, and hippopotamus; the tail of an elephant, the skin of a rhinoceros; feet of a bear; skulls of monkeys; daguerreotype of the Aztec children, etc. Upon the upper shelves of this and the next case will be seen models of the heads of men distinguished for good or bad qualities, by the side of the heads of various wild and domesticated animals. These specimens were designed to illustrate phrenology.

A number of stuffed mammals appear in the last case upon the north side of the room. Upon the lower shelf is a badger from Minnesota, and a hedgehog, or porcupine, from Leveret. Upon the second shelf are two young otters from Hadley, and between them a skeleton of a full-grown otter. Near them is a preserved specimen of an Ornithorhynchus, or duck-billed platypus, one of the most singular of all mammals, being the connecting link between mammals and birds. Its bill, feet, and part of its internal structure are ornithic. The males have a spur upon the hind legs. Its hair is intermediate in character between hair and feathers. When this animal was first brought to the notice of European naturalists, in the dried state, it was thought to be an imposition; but subsequent examination has proved the genuineness of his existence. Upon the third shelf are quite a number of small mammals. There is an interesting series of squirrels, the gray and black from Niagara Falls, with varieties of the same species, the chipmunk, red squirrel, common flying squirrel, and the larger flying squirrel from Hudson's bay. The winter and summer dress of our common weasel, the one white and the

other gray, may be seen. Other animals are the raccoon, muskrat, sable, and woodchuck. Upon the upper shelf are specimens of rats, mice, and moles, with their skeletons. All will be interested in observing the large spade-like front feet of the mole. Here, too, is a three-toed sloth from Guiana, in whose construction, as Cuvier says, "Nature seems to have amused herself with producing something imperfect and grotesque." No less curious are two species of armadillos from South America.

A few anatomical illustrations and models are found in the very small case in the corner.

Commencing at the right-hand side of the long case at the west end of the room, one sees first some monstrosities. One is a very fine specimen of a double calf, presented by Dr. Anthony Jones, of Newburyport. Another is a double-headed lamb, and the third is a calf possessing a rudimentary porcine snout. Next is a fine panther, called also American cougar, catamount, and Indian devil. It is one of the cat tribe. Near it is a beautiful tiger-cat, lying upon its side, from Mexico. The most prominent object here is a large Greenland seal; in front of which are some smaller animals, particularly a small pig from New York City. Beyond the seal are several carnivorous animals, whose position may be found best by consulting the labels. They are a young Canada lynx from Maine, a very stout animal of the cat family, Lynx Canadensis. A savage-looking wild cat, Lynx rufus, is worthy of notice, because it was killed recently at the West Farms in Northampton. One can readily distinguish between the cats proper and the lynces. The former always have quite a long tail, and the lynces a very short one. Near by is a fisher, or black cat, from Ashland, Me., and a skeleton of the same animal from Wilmington, Vt.

The large manikin is made of papier maché, and is so constructed that it can be taken to pieces, and each muscle and organ of the body seen in its proper place. This, with the skeleton and other models of parts of the human body, are used to illustrate the subject of human anatomy to the classes.

About the manikin are various skeletons, particularly those of a small monkey, muskrat, domestic cat, skunk, etc.

A beautiful specimen of the Vulpes lagopus, or white arctic fox, will attract universal attention. It was presented by Rev. C. C. Carpenter, missionary to Labrador. It is the animal's winter dress, the summer coat being of a dark color. Near it is a specimen of a young seal, captured off Minot's Ledge, whose fur is very smooth, quite the reverse of that upon the larger animal of his tribe. The skeleton of a black bear, rather young, from Wilmington, Vt., succeeds, which is followed by a much larger specimen of the same genus, — the grizzly bear of the Rocky mountains, — Ursus horribilis, *Ord.*, — the terror of the mountain country. He is represented, characteristically, in the act of feeding upon a deer recently killed. On the wall behind is suspended the skin of the great grizzly bear of Asia Minor, presented by Rev. H. J. Van Lennep.

Beyond the bear is an animal, the cause of terror in quite another sense, from his power of producing strong odors, — our common skunk, with its young. Near it is a fine specimen of a raccoon, a starved specimen of our common fox, with a skeleton, and an opossum, our American representative of the Marsupials. As this is a male, the pouch in which the young are carried is not present.

BIRDS.

At the south end of this large case are a few large birds. The American loon, or northern diver, is represented as flying; a fine large wild turkey is near him, also two very large albatross from the South Atlantic ocean.

In the upright cases upon the south side of the room the birds are arranged according to their natural affinities. So far as is possible, they are arranged according to Prof. Baird's system of classification in his Ornithology. In the first case are the Acciptres, or the birds of prey. Upon the second shelf are the golden eagle, three specimens, several large hawks, a pair of snow owls, great horned owl, etc. Smaller owls and hawks, with several skeletons, are upon the upper shelf.

Upon the upper shelf in the second case are the woodpeckers, cuckoos, parrots, etc. Upon the third shelf are a large number of warblers, orioles, etc., largely from Ceylon.

On the second shelf are larger species, such as the scarlet tanager, some of the thrushes, etc. In the upper part of the third case are a number of sparrows, finches, grossbeaks, cardinal-bird, snow-bird, etc. On the lower shelf are partridges, among which are two specimens of the willow grouse, or ptarmigan, from the arctic zone, meadow-lark, blackbirds, crows, raven, etc. One of the most singular varieties are two specimens having exceedingly long though very slender tails. These are from Ceylon. For most of the specimens from that country we are indebted to Rev. Milan H. Hitchcock.

In the upper part of the fifth case are numerous snipes, curlews, woodcocks, plover, etc., mostly from Massachusetts. Below are some of the Grallæ, or waders, birds with very long legs, who live in marshes. Among them are the night heron, green heron, bittern, roseate spoonbill, scarlet ibis, etc. In the next case are more of the snipes, etc., above, and below the Natatores, or swimmers, the web-footed birds. These embrace the ducks, geese, auks, etc. Interesting specimens are Richardson's jager, the nearest approach in the collection to Mother Carey's chickens, a small auk, with peculiar bill, from Greenland, and the hooked morgansor. Two goosanders from North Hadley are unusually fine specimens of the kind.

In the lower part of the next case are large numbers of the eggs and nests of birds, illustrating the science of oölogy. Interesting specimens are the eggs and nest of the marsh wren, the humming-bird, golden-crowned thrush, the eggs of the African and Australian ostrich. Upon the third shelf are examples of the nests of the American and Ceylonese hanging birds, placed side by side, to illustrate the differences in the American and Ceylonese fauna. Here the birds have their nests open at the top, having very few enemies which cannot be avoided, at the ends of the long tapering branches to which they are suspended. But in Ceylon such a mode would be open to the attacks of snakes. Accordingly instinct directs the parent bird to have the entrance to the nest from the bottom, and by this means the young birds are as secure in Ceylon as in America. Other specimens here are eggs from Europe, Ceylon, etc.; also

the skulls of many American birds. On the upper shelf are portraits of distinguished naturalists, list of donors; of families of Coleoptera, and charts to illustrate the classification of the animal kingdom and the distribution of animals.

BOTANICAL SPECIMENS.

The rest of the upright cases on the south side of the room are devoted to botanical specimens; a large number, four hundred species, of dried seeds and fruits, with one hundred and seventy-five smoothed sections of different sorts of wood, chiefly from tropical regions. A Nelumbium, or water-lily, from Jamaica, is preserved in spirit, also a night-blooming ceres from a conservatory. There are specimens of cotton from the regions in the Southern States where it has been cultivated so successfully, and from new regions in Africa, where its culture is as yet experimental. Numerous specimens of branches and trunks of our common trees may be seen, and particularly a section of a cocoanut tree from Jamaica, and of the Pendleterry tree from Roanoke Island. Large specimens of curiously bent branches and twigs, or of a reunion of branches once separated, and many other varieties of interesting forms of vegetation may be seen.

The Herbarium proper is partly placed in the drawers at the east end of the room, and partly in the botanical-room below. About four thousand well-determined and well-mounted species make up the collection. Under the guidance of Professor Tuckerman and the skilful manipulation of Mr. Goodale, this collection has lately assumed a new importance. It is divided into three systematic collections: the *Flora normale*, or all those plants growing within ten miles of the College, which is designed especially for purposes of instruction; the *Flora Americana*, embracing all American species, which is nearly complete for the United States species; and the *Flora exotica*, comprising all foreign plants.

All persons who are familiar with the progress of botany, are aware that Professor Tuckerman has devoted special attention to the *Lichens*, an order of cryptogamous plants,

and that he is the highest authority upon them in this country. He has a very fine private collection of these interesting plants at his residence, consisting of five hundred species of American, and three hundred foreign species, of lichens, besides two hundred or more species of other cryptogams.

ARTICULATA.

Having finished our notice of the wall cases, it becomes us now to describe the specimens exhibited in the horizontal cases. Those containing the articulate animals commence in the horizontal cases at the east end, near the upright cases containing the zoöphytes, and in passing to the west the observer will descend the articulate scale. The highest orders are placed at the beginning of the classification. The first is the division of the Coleoptera, or the beetles, which is the best illustrated of any division of the articulate animals. The specimens are impaled on the long and elastic insect pins of German manufacture, and are arranged in columns, with the label under each specimen, with names of species, of locality, and of donor. The generic name stands at the head of the column, and the name of each family and sub-family of genera is on a block at the head of the family. The pins are set in sticks of pine, which contain a groove filled with cork, the whole being covered with white paper. The width of the sticks, $1\frac{4}{10}$ inches, allows them to be placed in contact without interfering with the labels, and each family is bounded by blank sticks. The details of this part of the cabinet are too numerous to be given here. It will be seen that there are about fifteen or sixteen hundred species of beetles in five hundred and nineteen genera, which represent sixty-six of the seventy-three families of Coleoptera.

The Coleoptera occupy the first seven of the horizontal cases. We would call attention to the following families and specimens, as the more interesting: In the first case the families Cicindelidæ, Brachinides, and Carabidæ, are well represented. Of the Brachinides, the large Mormolyee phyllodes from Java will attract attention, on account of its singular, broad margin. In the second case the families Dycticidæ and Silphiadæ are worthy of notice. Some of

the large specimens of the Scarabidæ, in case number three, are the largest of all the beetles. We would call attention to the Scarabæus Hercules, S. Theseus, and Goliathus Cocicus; also to the family Buprestidæ. In the sixth case all will be interested in examining the Prionidæ and Cerambycidæ, the latter having very long antennæ. The Cerambyx sericeus from Bahia shows this character the most distinctly. In the seventh case are the Cassodulidæ and Coccinelidæ, or the lady-bugs.

Among the Orthoptera the Mantis religiosa is interesting, from its singularity. One specimen of Orthoptera, with large wings of delicate pink and bright green colors, is very handsome. There are very few Neuoptera in the collection. The Hymenoptera, the bees and the wasps, in the next case, are more numerous. A large number of those exhibited are from Georgia.

All will be interested in inspecting the Lepidoptera, — the moths, millers, and butterflies, — which occupy the two end cases of the first row. Many of these specimens are from the tropics, and display well the rich colors belonging to the "winged flowers" inhabiting those regions. The first case in the second row (at the west end) contains the Heteroptera, Homoptera, and Diptera. A common example of the first order is the Cimex lectularius, or commonly kown as the bed-bug. Those who have never seen this animal will be gratified to be able to see him with a pane of glass intervening. Those who may be familiar with them may like to compare the quality of the different breeds, to see whether the animals can thrive as well when feasting upon the juices of collegians, as upon others in the community, — for it must be confessed, as the label makes patent, that South College is inhabited by these wild beasts. If we may believe the numerous stories narrated by collegians of their powers, these animals are both heroes and giants; their superior energies being, no doubt, implanted by the higher quality of their diet, deriving in some degree the energy and spirit of those from whom the juices are extracted.

Among the Homoptera, the most conspicuous objects are the Cicadæ, of whom the poet sings: —

> "Happy the cicada lives,
> Since they all have voiceless wives."

The Diptera are the flies. Many of those exhibited are very large. The gnat and mosquito belong to this order; also the black fly, so troublesome in the wild lands of our continent. The male mosquitos are perfectly harmless, and it is said to be only the females who charm by their music the victims of their voracity.

In the second case in this row are miscellaneous specimens, among which are scorpions, scolopendræ, and those curious habitations of the spider, from Jamaica. In the third case is a valuable collection of crabs from Jamaica, which were made by Professor Adams, at the expense of W. A. Nichols, in one of his visits to the island. Many rare forms are found among them. They have recently been named at the Smithsonian Institution. In the fourth case is a fine collection of Cirrhopeda, which are noticed under the description of the mollusca. They are true articulates, but were formerly referred to the mollusca. In the last case only miscellaneous specimens are now placed, consisting largely of duplicates. There is, however, a curious insect from Persia, of very noxious character, presented by Dr. Perkins of Oroomiah.

MOLLUSCA.

The splendid collection of the shells of Mollusca, presented by Professor Adams, is wholly in the horizontal cases to the left of those containing the insects. The classification commences at the southwest corner of the room, in the case close by the rapacious birds, and follows the south side of the case through the whole row, when it turns back along the other side of the first row to its starting point; then it commences again upon the corresponding side of the second row of cases, and then back again. In this way the order may be traced through all the rows, until the lowest species of mollusc is reached. About eight thousand species of shells are exhibited. Every guide to the classification which the visitor needs, will be found within the cases. No collection in this cabinet is more beautifully or systematically arranged than this.

The shells of the class Cephalopoda are represented by

several very large specimens. A cuttle-fish bone is nine and one fourth inches long. The pens of Loligo resemble films of glass. A paper nautilus (Argonauta argo), obtained by Professor Hovey, is remarkable for the manner in which a fracture had been repaired by the animal, so as to include a broken piece after it had been turned wrong side out. This fact corroborates the statement now generally admitted, that the so-called sails of the animal are used only for enveloping the shell. A more complete description of this fractured shell was published in the American Journal of Science for July, 1848. A Nautilus pompilius may here be seen, which is nine and a half inches long, and seven inches high.

In the class Gasteropoda, the first family, *Cypræidæ*, is represented by a majority of its known species in the eight genera. Most of the species are represented by numerous varieties.

Among its beautiful associates, the large and elegant Oliva porphyria is conspicuous. One of the specimens is four inches long. Of Cypræa pantherina there are seventy specimens, of which no two are alike. Of the costly Cypræa mappa there are seventeen varieties, all but one of which are in the most perfect state of preservation. Cypræa reticulata appears with four distinct groups of varieties. Several species of this genus may be seen in their different stages of growth, in form so unlike that the uninitiated would not suppose them to belong to the same group of animals. The magnificent specimens of Cypræa aurantium are very valuable and rare. They are worn as badges of office in some of the islands of the Pacific ocean, and command high price. There are one hundred species of this most beautiful of all the genera; and of these, perhaps none are surpassed in delicacy of tints by the small C. annulata and C. gemmula. C. testudinaria has been said to be the largest species in this genus; but here may be seen three large specimens of C. tigris of nearly equal size, one of which is nine and one eighth and eleven and two thirds inches in the transverse and longitudinal circumference, and consequently much exceeds the C. testudinaria in diameter. In contrast is a full-grown specimen of the same species (C. tigris),

which is only four and a half and five and two fifth inches in the above dimensions. Of Erato cypræoides, the only two specimens known to us are in this collection. Many other specimens in other families are probably unique, but our limits will not permit further notice of them. About four hundred varieties of fifty species of Marginella conclude this most fascinating of all the families of mollusca.

Of the second family, *Mitridæ*, will also be found all the known genera, and a large majority of the species. In the three genera, Voluta, Cymbium, and Melo, all the species are more or less rare. The specimens of Voluta imperialis may be noticed for its size, and V. delessertiana for its rarity and beauty. Of the eighty species of Mitra, several appear to be unknown to foreign collections, and M. ustulata is said by Mr. Reeve to be unique in the celebrated Norrisian collection (in England) of this genus. The genus Columbella concludes this family with sixty species of small shells, among which the rare C. dormitor of Sowerby appears, with several rich purple specimens, rendering it probable that the figure of this English author was taken from a bleached specimen.

The third family, *Purpuridæ*, also appear with a large majority of species in all its sixteen genera. Of Buccinum, including Nassa, there are about one hundred and twenty species. Among the forty species of Terebra, the T. maculata, "the marlinspike," in the nomenclature of sailors, is represented by several fine specimens, one of which weighs one pound, and another is eight and one third inches long. All the species of the beautiful genus Eburna appear; among them, the specimens of E. spirata are of unusual size and beauty. A large number of species of Ricinula and Purpura come next, and many of the shells are stained with the imperial purple for which these animals have long been celebrated, but which is superseded by the cochineal insect, that furnishes to the poor a luxury once restricted to imperial wealth and dignity. In the next genus is a good specimen of the rare and large Monoceros giganteum. Then we find the elegant genus Harpa, represented by forty varieties of seven species. A Harpa ventricosa is five inches long and three and a half inches wide.

Next is the genus Dolium, containing the great and rare Dolium melanostomum before mentioned, which is nearly ten inches long and eight wide. In the genus Cassis is the only univalve shell (a Cassis cornuta) which is too large to go into the cases. It is in an upright case, and is two feet ten inches in the longitudinal circumference, and two feet two inches around at the base of the tubercles. The genus Oniscia terminates this family.

The fourth family, *Magilidæ*, is wanting.

The fifth family, *Conidæ*, consisting of the single genus Conus, of which the collection contains one hundred and fifteen species, most of which are elegant, and the group of brocaded cones at the end of the series is eminently beautiful.

The sixth family of *Strombidæ* is represented by all the genera, and nearly all the known species. Both in Strombus and Pterocera the different forms of many species in different stages of growth excite not a little astonishment. The young and the old of Strombus galeatus and of Strombus gigas, and the seven stages of Pterocera lambis are remarkable examples. The largest specimens of the great Strombus gigas were collected by Prof. Adams, in Jamaica. One of them weighs six and a half pounds! and is the heaviest univalve in the collection. Perhaps the most elegant species in this family is the Strombus. One of the most rare and least beautiful specimens in this family is the full-grown Chenopus occidentalis. This family takes the visitor around the east end of the south row of cases.

An interesting relic may be seen among the specimens of Strombus gigas. It is the veritable conch shell which our fathers used for a bell upon College Hill, when the church occupied the place of the Woods Cabinet. All public meetings of the town, and the ordinary meetings of the Sabbath, were regulated by the sound of this shell, just as they now are by the bell. Our ancestors must have "had a large blow," since it is said that the reverberations from this worn piece of furniture were often heard in the streets of Old Hadley, four miles distant. It was presented by Mr. David Parsons.

Of the seventh family, *Muricidæ*, we find a majority of

the known species. Of the well-known Triton variegatum, we find a series from one third inch to fourteen inches long. A Murex ramosus has one of its fringed spines four and a half inches long, and measures ten and a half inches between the most distant points of the shell. Several large specimens of that gorgeous species, Murex regius, may be seen near the great specimens of Murex ramosus; one of them exceeds, and each of the two equals, a pound weight. Perhaps the most beautiful of this family, among the large shells, are three specimens of Murex bicolor. In the genus Pyrula is one of the largest and heaviest specimens of heterostrophe (left-sided) shells, a specimen of Pyrula perversa, eleven and three fourths inches long, and weighing three pounds. In the genus Ficula, unequalled for graceful forms, in addition to the four species described by Mr. Reeve, we find a fifth, Ficula papyratia, of Say. Specimens may be seen next of Fusus aruanus and of Fasciolaria gigas, species which attain a greater size than any other univalve shells. The specimen of the former is richly colored, and exceeds seventeen inches in length; it weighs four and a half pounds. A larger specimen may be seen in the upright cases. About ninety species of Pleurotoma, including Mangelia, mostly small shells, terminate this family, which otherwise consists chiefly of large species.

The eighth family, *Turbinidæ*, is represented by fifteen genera, and many hundred species. Of that extraordinary shell, Scalaria pretiosa, which was once valued at one hundred guineas, but is now comparatively common in collections, there are three specimens. In this family is the least of all our marine shells of mollusca, Skenea serpuloides, weighing, when mature, one hundredth of a grain, accompanied by highly magnified figures drawn by Mrs. Adams. In the genus Turbo may be seen many solid opercula (eyestones) of curious forms. One of them is large enough for the eye of a Polyphemus, being three and one third inches in diameter. A shell of the great Turbo marmoratus, to which species the Operculum belongs, is six and three fourths inches wide. The collection contains a large number of fine and rare species in this genus (Turbo). Passing by Trochus, we find three species of Phorus, celebrated for in-

serting into their own shells, in the progress of growth, small stones and other shells, whence they have been called Mineralogists and Conchologists. In the genus Cingula, some embryo specimens of C. minuta do not exceed one five hundredth of a grain.

The ninth family, *Littorinidæ*, contains a large number of species, with endless varieties. Many of them, although marine shells, are so amphibious in their habits, that they were found by Prof. Adams on bushes and dry sticks and rocks near the shores of Jamaica, and although packed closely, were alive in Vermont during the following summer. Some of the most extraordinary forms of shells are in this family, in the genus Chemnitria, but unfortunately the shells are so small as not to be visible in their curious details of form and structure.

The tenth family, *Haliotidæ*, contains a large portion of the known species, one of the most remarkable of which was recently described by the Curator, with the name of Haliotis ponderosa, the weight being two pounds two ounces! Here are two large shells of this genus (Haliotis), polished by J. T. Ames, Esq., of Chicopee. The extraordinary degree of lustre, combined with the vivid play of prismatic colors, place them among the most elegant products of nature and art combined. Many other polished specimens may be seen in the cabinet, and they are valued as exhibiting interesting properties in shells; for it is not merely the object of the cabinet to exhibit the characteristics of species, but their entire history, as far as practicable. That these results of the unrivalled skill of Mr. Ames will never be equalled, we will not affirm, but we are quite confident that they never have been.

Family eleventh, *Tornatellidæ*, family twelfth, *Vermetidæ*, — remarkable for its shells being tubular and often intertwining and adhering solidly in masses, — and family thirteenth, *Janthinidæ*, — remarkable for its delicate purple shells that float in the open ocean, — occupy a small space after the large specimens of Haliotis.

Family fourteenth, *Naticidæ*. Here is a gigantic Natica heros, the largest known, being four and one eighth inches long. Here also is the singular spawn of two species of

this genus, imbedded in a lamina of sand, and the whole agglutinated in the form of a saucer, without the flat base of this utensil. Family fifteenth, *Neritidæ*, commences near the west end of the second row of cases, and contains innumerable varieties of these beautiful shells, which are mostly inhabitants of tropical or warm climates. The genus Neritina, which was once supposed to be only a marine genus, is divided into two groups, the marine and the fluviatile, the latter ending the family on the right.

The sixteenth family, *Melanidæ*, contains a very numerous group, as may be seen in the cases, where are six genera and several hundred species. The first genus, Rissoa, is remarkable for the uniform small size of its shells. Of fifty species in the collection the largest is less than one eighth inch wide. This and the next genus, Cerithium, are marine, but all the rest are from fresh water. In the rare and extraordinary genus Io, we find fluviatile shells with a canal, an organ which otherwise is found only in marine mollusca; and, singularly enough, this genus is limited to a single river, Holstein river, Tenn., the water of which is made brackish by salt springs. Melania will be seen to have a great number of species, which are mostly from the streams of the Western States.

The seventeenth family, *Paludinidæ*, are all from fresh water. Here may be seen, side by side, the numerous Paludinæ of temperate climates, and the Ampullariæ, which take their place in hot climates. Among the latter is one which was taken at Bangkok, in Jan., 1842, and sent to Professor Adams as a fossil shell; but it contained the living animal so completely protected from evaporation by its solid operculum, that it reached Vermont alive, and perished only with the cold of the following winter.

The eighteenth family, *Physadæ*, also consists of numerous species of fresh-water shells. Among its rarities may be seen the large Limnæa megasona, ten specimens, and the singular and rare L. gracilis, from its only two known localities in Lake Champlain and in Ohio, some of the latter being of unusual size.

The nineteenth family, *Cyclostomidæ*, is the commencement of an extensive series of land shells, which are the

favorites of so many collectors. This family is mostly restricted to tropical climates. Here is Pupina, peculiar among land shells for its brilliant polish. Here, also, are some of the most valuable of the collections made by Professor Adams in the island of Jamaica, and several of the species are scarcely known in other collections. The prevailing color of the labels will show at a glance how rich are the West Indies in these beautiful operculated shells.

The twentieth family, *Helicidæ*, contains the rest of the land shells, making the number upwards of one thousand species. Here may be seen entire genera mostly or wholly limited to comparatively small portions of the earth's surface. The Achatina perdix from Liberia, the most gigantic of land shells, may be seen, six and a half inches long and four inches in diameter. A little further is the least of all the full-grown shells in the collection, Pupa milium, weighing two hundredths of a grain. A specimen is enclosed between plates of mica in a slip of ivory, and placed at the side of the case so as to be easily seen by visitors. At the end of Bulimus and commencement of Helix are the elegant land shells of the Phillipine Islands, comprising many rarities. Next are the snail shells of Europe, an extensive series. Farther on, the snail shells (Helices) of the United States will be seen to be much inferior in beauty to any of the other geographical groups of this genus.

The twenty-first family, *Limicidæ*, exhibits the naked snails. The twenty-second family, *Aplysidæ*, is represented by the internal shells of these animals.

The twenty-third family, *Bullidæ*, contains the curious bubble shells of Bulla, etc. The twenty-fourth family, *Rimulidæ*, comprises numerous species, Fissurella, with an opening, often shaped like a keyhole, in the summit. The twenty-sixth family, *Umbrellidæ*, is represented by very large specimens of these rare shells. The twenty-seventh family, *Patellidæ*, comprises numerous species of Patella, limpet shells, and of Chiton resembling coats of mail. Families Phyllididæ, Doridæ, and Eolidæ, destitute of shells, are not yet represented. The family *Calyptræidæ* closes the Gasteropod class.

Commencing in the next case with the class Brachiopoda,

we find the first order represented by ten species of Terebratula, and the second order by Orbicula, Crania, and Lingula.

The next class, Acephala, first order Unimusculosa, first family *Ostraeidæ*, contains the irregular pearly Anomiæ, and the pearly Placunæ, pulverized and used for spangling water colors by the Chinese, and closes with the true oysters, some of the specimens of which are of gigantic size.

The second family, *Pectenidæ*, is represented by five of its six genera. The hinge of Spondylus will be admired for its mechanism. Of the great water Spondylus one weighs fourteen pounds; another has in it a hole of the diameter and length of a finger, made by a boring shell, which may be seen farther on in its genus Lithodomus. The great genus Pecten (scollop shells) will be admired for its beauty. Here is the Pecten Jacobæus, the flat valve of which was worn by the Crusaders as a cockade, a fact thought by Voltaire to account for all fossil shells.

Family third, *Malleidæ*, appears next with several genera, among which will be seen the curious hammer oyster (Malleus), and the pearl oyster, Avicula margaritifera, with several varieties and stages of growth.

The second order, Bimusculosa, commences with family first, *Mytilidæ*, and comprises the muscle shells and those large thin shells the Pinnæ. The second family, *Tridacnidæ*, contains the largest of all shells, constituting Tridacna and Hyppopus, of which many of the species are in the case. The only bivalve which could not be placed in the cases (which are seven inches deep), is the great T. gigas in the upright case.

The third family, *Hyppuritidæ*, contains only fossil species, and is represented in the Geological Cabinet. The fourth family, *Chamidæ*, is represented by many of the irregular shells of Chama: some elegant shells of deep red and delicate yellow will here be seen firmly adherent to each other.

The fifth family, *Unionidæ* (fresh-water clams), is represented by all the genera and a large majority of the species. With their numerous varieties they occupy several cases. Among them will be seen the largest of fresh-water

shells, Unio heros of the Western States, a heavy shell, of which one specimen is eight inches long and four and three quarters inches high.

The sixth family, *Arcidæ*, contains the many-toothed shells. Here is the largest Nucula limatula known; the huge Arca grandis, and the odd A. tortuosa, with the Noah's arks, form a singular group of shells.

The seventh family, *Cardiidæ*, contains many noble shells. The Cardita Cuvierii, of which only five other specimens are known, four in England and one in this country, is the largest of the genus. In Cardium will be seen many large and fine specimens. The specimen of C. elatum is probably not surpassed, being five and a quarter inches long and six inches high.

The eighth family, *Venidæ*, is represented by an extensive series of these most elegant of bivalve shells, commencing with Astarte, and ending with Cyprina. Here will be seen an elegantly polished valve of the common quahog. The ninth family, *Cyrenidæ*, consists of fresh-water shells. Here are four specimens of the rare Galathea radiata of Western Africa, at the beginning of this family, which closes with the small shells of Cyclas, so common in New England. The tenth family, *Tellenidæ*, commences with the rare and elegantly sculptured Corbis fimbriata. Here may be seen the remainder of the Tellenida, ending with Sanguinolaria. The eleventh family, *Petricolidæ*, contains a few species of Vernerupis, Petricola, and Saxicava.

The twelfth family, *Mactridæ*, is represented by six of its seven genera, commencing with Amphidesma and ending with Lutraria. In the genus Mactra will be seen large and fine species. The Mactra solidissima, polished by Mr. Ames, exhibits in a beautiful manner the layers of growth, and resembles ash-colored agate. Family thirteenth, *Thracidæ*, is represented by all its four genera, Osteoesma to Anatina, and contains many rare and delicate shells. The fourteenth family, *Myidæ*, contains Pandora, Corbula, and Mya. In the latter genus will be seen a gigantic specimen of the common long clam, Mya arenaria, from Chelsea beach in this State; this shell is five and a half inches

long and three and a half inches high. Family fifteenth, *Solenidæ*, commences with Solemya and ends with Solen. In the former will be seen two of the finest specimens known of that rare and curious shell, S. borealis. All the specimens of Glycimeris were taken from the stomachs of fishes. In Solen will be seen a large number and variety of razor shells. Family sixteenth, *Pholadidæ*, contains Pholas and Teredo. A fragment of a tube of the latter is one and a half inches in diameter. The seventeenth family, *Aspergillidæ*, is represented by Gastrochena (the gapers), Aspergillum (the watering-pot shells), in which the two little valves may be seen soldered into the long tube, and Fistuluria.

In the class Cirrhopoda, the first order, the *Pedunculated* Cirrhopods, is represented by five genera, of three of which the animals are preserved in alcohol. The second order, the *Sessile* Cirrhopods, is represented by barnacles of six genera. Here may be seen the great Balanus tintinnabulum, which infests the sides of ships.

Several large specimens are exhibited in different parts of the room. Among them are the following: The cranium of a hunchback whale, the lower jaw with the teeth of a young sperm whale, presented by Rev. W. A. Mandell; the ribs, vertebrae, and jawbones of whales; the skeleton of the black-fish, a small whale or cetacean from Provincetown, and the skeleton of a horse. The blackfish, Glolicephalus melas Serson, will give a good idea of the structure of the whale division, since they are really small whales, the common name of "fish" being inappropriate. It is from Provincetown. The skeleton of the horse was mounted by Professor E. Hitchcock, Jr. Many persons mistake the large jawbones of the whale, under the Coleoptera case, for the ribs. Two of the ribs are placed adjacent to the jawbones, in order that the difference between them may be readily appreciated.

A number of other large specimens will shortly be placed in the Cabinet, and will be seen by most of the possessors of the Guide Book. They are beaver skeletons, a caribou skeleton, and the skeleton of a female moose, all from Ashland, Maine, and procured by the kindness of

Rev. M. R. Keep. The visitors of the Zoölogical Cabinet, and all who are interested in the higher animals, are greatly indebted to this gentleman for his efforts in gratuitously procuring these large specimens for the cabinet. A missionary in one of the outposts of civilization, with a salary reduced to the starvation point of the missionary scale of reckoning, his love for natural history impels him to cultivate its practical acquaintance, and assist others in the acquisition of specimens. He has sent our collectors here specimens which cannot be found in any other cabinet in our country, and whose value all told must now be estimated at no less than two hundred dollars. His services in aiding the Scientific Survey of Maine have also been of great value, as we can personally testify after a difficult jaunt through the thickets surrounding Mt. Katahdin.

The total number of species of animals and plants exhibited in the Appleton Cabinet cannot be less than eighteen thousand.

We cannot better close this sketch of the cabinets than by quoting some remarks made by Professor Adams in reply to allusions made to his cabinet in 1848 by Professor B. Silliman, Sen., at the dedication of the Woods Cabinet. They will show the spirit which actuated his arduous labors.

"The efforts of naturalists to exhibit the true order of nature, can never fail to gratify a correct and refined taste. Such order is of far higher origin than mere human invention, and is so perfect as to harmonize no less with our emotions of beauty than with our ideas of fitness and method. It is indeed one of the most delightful features of science, that the farther she advances in a correct knowledge of nature, the more systematically and harmoniously are all the powers of the intellect and the emotions of beauty and virtue gratified and invigorated. Nor can the lesson of humility be lost on the lover of science, since his highest efforts consist only in the discovery and exhibition of a beauty and perfection, which not only does not originate in him, but which extends far beyond the most distant flights of his imagination. A feeble beginning has been made here in the

exhibition of the divine plan of nature. That it should meet the approbation of one whose life has been a long series of eminent services rendered to science, is truly gratifying. We are encouraged to hope that what has been done is in harmony with the highest truths, when it is regarded with satisfaction by one who has been accustomed, in the diffusion of science, ably and happily to illustrate the infinite glories of the great Author of nature."

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